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To the Memory of

JOEL ASAPH ALLEN

Eminent mammalogist and ornithologist, who, in addition to his duties as curator, for thirty-two years directed and edited the Bulletin and Memoirs of The American Museum of Natural History, this volume of his posthumous papers is dedicated.

Science
A

BULLETIN

OF

THE AMERICAN MUSEUM OF NATURAL HISTORY

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ERRATA

Page 233, line 16 from top, for *Leol. azandicus* read *Leo l. azandicus.*
" 264, line 2 of table, for *ituriensis* read *iturensis.*
" 287, line 1 from top, for 1625 read 1925.
" 328, footnote, lines 1 and 2, for synonym read homonym.
" 359, line 23 from bottom, for LXVII read XLVII.
" 477, line 14 from bottom, for Fsihego read *Fsihego.*
" 477, line 12 from bottom, for Matsche read Matschie.
" 481, line 19 from top, for *Fsihego ituricus* read *Fsihego ituriensis.*

BULLETIN

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Article I.—THE AMERICAN MUSEUM CONGO EXPEDITION COLLECTION OF INSECTIVORA[1]

BY THE LATE J. A. ALLEN[2]

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[1] Scientific Results of The American Museum of Natural History Congo Expedition. Mammalogy, No. 5.

[2] This paper was in press at the time of Dr. Allen's death but the final proofs were not seen by him. —EDITOR.

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INTRODUCTION

The collection of Insectivores obtained by the American Museum Congo Expedition[1] numbers about 377 specimens, of which 51 represent the Potamogalidæ, 140 the Macroscelididæ, 9 the Erinaceidæ, and 177 the Soricidæ. In the preparation of this paper the author has had the efficient coöperation of Mr. Herbert Lang, the leader of the American Museum Congo Expedition. The colored plate (Plate I), illustrating individual variation in coloration in *Rhynchocyon stuhlmanni claudi*, is by Charles R. Knight. The text illustrations are from excellent pen drawings by Mrs. Ziska.

In working up the material here recorded valuable assistance has been obtained through material loaned for comparison by the authorities of the United States National Museum, through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals, and from the Museum of Comparative Zoölogy at Harvard University, through the kindness of Director Samuel Henshaw and Dr. Glover M. Allen, Curator of Mammals.

The Soricidæ of the Congo Expedition were placed for determination in the hands of Mr. N. Hollister, Assistant Curator of Mammals at the United States National Museum, in 1916, he having then been for sometime engaged in a critical study of the African Soricinæ in the National Museum. His report on the shrews of the Congo Expedition was published in October 1916.[2]

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[1] Supplemental Note on *Hipposideros langi* Allen (Bull. Amer. Mus. Nat. Hist., XXXVII, pp 434–438, text figs. 4–6. September 29, 1917).

Since the publication of the paper on the Congo Expedition Collection of Bats, I have had an opportunity to compare, through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals in the United States National Museum, three skins and four skulls identified as *Hipposideros cyclops* (Temminck), from Efulen, Cameroon. While these specimens are not from the type region of *cyclops* (Boutry River, Gold Coast), it is interesting to note that they are uniformly and strikingly different in coloration from the series on which *langi* was based, indicating at least considerable plasticity in the *cyclops* group. In *langi* the whole head is yellowish brown, in strong contrast with the upperparts of the body, while in the Efulen specimens it is uniform in color with the back and the upperparts are also much darker than in *langi* The measurements, both external and cranial, indicate slightly larger size for the Efulen form. While *langi*, as stated in the original designation, is a member of the *cyclops* group, it should evidently be recognized as a well-marked geographic race, under the designation *Hipposideros cyclops langi*, and the Efulen specimens as *H. cyclops micaceus* (de Winton: type locality "Como River, 75 miles from Gaboon"), with the description of which the Efulen specimens agree and with which the *langi* series does not agree. Whether or not *micaceus* is referable in a strict sense to true *cyclops* I have not the means at present for determining.

[2] 'Shrews Collected by the Congo Expedition of the American Museum.' By N. Hollister. Bull. Amer. Mus. Nat. Hist., XXXV, pp. 663–680, Pls. VII–XI. October 21, 1916.

LIST OF LOCALITIES, WITH NAMES OF THE SPECIES AND SUBSPECIES, AND NUMBER OF SPECIMENS TAKEN AT EACH LOCALITY

Localities	Species and Subspecies	No. of Specimens	Totals
Akenge	*Rhynchocyon stuhlmanni claudi*	5	5
Avakubi	*Potamogale velox*	1	
"	*Rhynchocyon stuhlmanni stuhlmanni*	2	
"	*Crocidura nyansæ kivu*	3	
"	" *jacksoni denti*	6	
"	" *bicolor*	1	
"	" *oritis*	1	
"	" *latona*	1	15
Babeyru	*Crocidura jacksoni denti*	1	1
Bafwabaka	*Potamogale velox*	1	
"	*Crocidura jacksoni denti*	1	
"	*Scutisorex congicus*	2	4
Budongo Forest	*Rhynchocyon stuhlmanni stuhlmanni*	1	1
Faradje	*Potamogale velox*	2	
"	*Nasilio fuscipes*	21	
"	*Atelerix faradjius*	2	
"	" *langi*	6	
"	*Crocidura sururæ*	1	
"	" *lutrella*	1	
"	" *turba nilotica*	3	
"	" *jacksoni denti*	5	
"	*Sylvisorex gemmeus irene*	1	42
Gamangui	*Potamogale velox*	1	
"	*Crocidura nyansæ kivu*	1	
"	" *jacksoni denti*	2	4
Garamba	*Nasilio fuscipes*	1	
"	*Atelerix langi*	1	
"	*Crocidura sururæ*	1	3
Lubila	*Crocidura congobelgica*	1	1
Medje	*Potamogale velox*	30	
"	*Rhynchocyon stuhlmanni claudi*	20	
"	*Crocidura nyansæ kivu*	16	
"	" *caliginea*	1	
"	" *jacksoni denti*	51	
"	" *oritis*	4	
"	" *latona*	1	
"	" *ludia*	2	
"	" *polia*	1	
"	" *congobelgica*	1	
"	*Sylvisorex gemmeus irene*	18	
"	" *oriundus*	1	
"	*Scutisorex congicus*	42	188

Localities	Species and Subspecies	No. of Specimens	Totals
Nala	*Rhynchocyon stuhlmanni claudi*	1	
"	*Crocidura turba nilotica*	1	
"	" *jacksoni denti*	3	5
Ngayu	*Crocidura ludia*	1	1
Niangara	*Potamogale velox*	3	
"	*Nasilio fuscipes*	8	
"	*Crocidura jacksoni denti*	2	13
Niapu	*Potamogale velox*	13	
"	*Rhynchocyon stuhlmanni claudi*	79	92
Penge	*Rhynchocyon stuhlmanni stuhlmanni*	2	2

NEW SPECIES AND SUBSPECIES, WITH THEIR TYPE LOCALITIES

1. *Atelerix faradjius* J. A. Allen. Faradje.
2. " *langi* J. A. Allen. Faradje.
3. *Crocidura caliginea* Hollister.[1] Medje.
4. " *oritis* Hollister.[1] Avakubi.
5. " *latona* Hollister.[1] Medje.
6. " *ludia* Hollister.[1] Medje.
7. " *polia* Hollister.[1] Medje.
8. " *congobelgica* Hollister.[1] Lubila.
9. *Sylvisorex oriundus* Hollister.[1] Medje.

GENERAL SUMMARY

Families	Genera	Species and Subspecies	Specimens	Localities
Potamogalidæ	1	1	51	7
Erinaceidæ	1	2	9	2
Soricidæ	3	15	177	11
Macroscelididæ	2	3	140	10
	7	21	377	

POTAMOGALIDÆ

Potamogale velox Du Chaillu

Cynogale velox Du Chaillu, 1860, Proc. Boston Soc. Nat. Hist., VII (1859–61), November, pp. 361–363. Ogowe River, French Equatorial Africa. (*Potamogale* tentatively proposed on p. 363 in place of *Cynogale*.)

Mystomys velox Gray, 1861, Ann. Mag. Nat. Hist., (3) VIII, July, p. 61.

Mythomys velox Gray, 1861, Proc. Zool. Soc. London, p. 275. Believed to be a rodent.

Potamogale velox Du Chaillu, 1874, 'A Journey to Ashangoland,' p. 118. Further notes on the species, in defending himself against erroneous and unkind criticism.

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[1] Described 1916, Bull. Amer. Mus. Nat. Hist., XXXV.

Potamogale velox Allman, 1866, Trans. Zool. Soc. London, VI (1869), pp. 1–16, Pl. i (animal), Pl. ii (skeleton), text figs. 1–9 (hair, head, ear, feet, anal glands, and sexual organs). A spirit specimen (dentition not complete, lacking the last molar) from Old Calabar.

Potamogale allmani Jentink, 1895, Notes Leyden Mus., XVI, p. 234. Based on Allman's (as above) detailed account and figures of an immature specimen from Old Calabar, having only 36 teeth.

Potamogale allmani Grandidier, 1904, Bull. Mus. d'Hist. Nat. Paris, X, p. 51. Two immature specimens, each with only 36 teeth, provisionally referred to Jentink's "espèce incertaine," "si son existence réelle était démontrée." Of 9 specimens in the Paris Museum (3 of them without skulls) 6 were yellowish beneath and each of the skulls, so far as available, had 40 teeth. These were referred to *P. velox*.

Potamogale velox argens Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 470. Two specimens: Medje and Poko, Belgian Congo.

Represented by 51 specimens (with skulls and 7 skeletons), collected as follows:

Medje, 30 (19 males, 11 females): January 24, 25, March 2–31, April 10–17, May 9 and 13, August 31, and September 10, 1910; February 27, April 16, June 4, and July 18, 1914.

Bafwabaka, 1: January 9, 1910.

Gamangui, 1: February 20, 1910.

Niangara, 3: November 11–29, 1910; and June 20, 1913.

Faradje, 2: February 21 and May 22, 1911.

Avakubi, 1: December 9, 1913.

Niapu, 13 (10 males, 3 females): November 26–December 31, 1913.

The males number 36, the females 15. The number of fully adult specimens (of which measurements are given below) is 20 (16 males, 4 females). More than one half are immature, varying from those in which the third molar, or both the second and third molars, are undeveloped (number of teeth 32 or 36) to those with mature dentition (40 teeth).

In respect to seasonal distribution, one or more specimens were taken in each month of the year except October, but the greater part at two quite distinct seasons of the year—December and March (November 26–December 31, 13 specimens; March 2–31, 16 specimens). This would seem to afford opportunity for the study of the influence of season upon the coloration and character of the pelage, but unfortunately, this is not the case, since only the Niapu series (taken in December) and a few others were made up from fresh specimens while the greater part (including nearly all of the large series from Medje) were not made up till they were received at the Museum several years later, when it was found that the fatty matter left on the skins had stained the white underparts.

Collectors' measurements of 7 adult males and 3 adult females from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	575 (555–610)	310 (298–325)	267 (250–290)	43.0 (41–46)	21.5 (21–23)
♀	603 (600–610)	323 (310–339)	284 (280–290)	41.7 (41–43)	21.5 (21–22)

Skull, same specimens, condyloincisive length: ♂, 63.8 (61.1–65.9); ♀, 64 (63.6–64.3).

Collectors' measurements of 5 adult males and 1 adult female from Niapu:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	586 (542–610)	329 (297–347)	260 (245–273)	45 (43–48)	22 (22–22)
♀	585	330	255	41	21

Skull, same specimens, condyloincisive length: ♂, 65.5 (63.8–66.5); ♀, 63.5.

Collectors' measurements of 4 adult males from other localities (Bafwabaka 1, Gamangui 1, Niangara 2):

Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
565 (550–583)	294 (279–312)	268 (260–272)	43.5 (43–44)	21.3 (20–22)

Skull, same specimens, condyloincisive length: 64.8 (62.7–66.7).

The above statistics indicate that there is no distinctive sexual difference in size. The smallest skulls in each series are, as a rule, the youngest, or skulls with full mature dentition but in which the teeth are wholly unworn and the cranial sutures still distinct. There is no skull young enough to show the milk dentition. In several skulls in which the first molars are fully developed, the condyloincisive length is 50–51 mm.; in those in which the second molars are fully up but the third molar is still enclosed in the gum it ranges from 53–55 mm.; during the development of the third molar the skull length increases to about 60–61.5.

Potamogale velox argens was based on two specimens, one from Medje and one from Poko. As no type locality was definitely indicated, Medje, the first locality mentioned in the description, is here designated as the type locality. Hence the present series of 31 specimens from Medje are topotypes. Poko and Niapu are both near Medje. The Niapu series of 13 specimens is in fine condition, the underparts being unstained, and agrees in a general way with the brief description of *argens;* it shows, however, that the white area of the underside varies in extension upward on the sides and that the development of brown-tipped hairs along its upper border is also a variable feature. The fore limbs are sometimes "almost wholly in the whitish area" and sometimes wholly brown above in specimens from the same locality and collected on the same day, showing this alleged distinction to be subject to a wide range of individuality. Specimens taken at approximately the same date vary greatly in the condition of the pelage in respect to wear, but, on the whole, December specimens, taken near the close of the dry season, appear more worn than those taken in March–May, the rainy period. But doubtless the season of moult varies in different individuals and, like the birth of the young, may extend over a considerable part of the year.

Only two forms of *Potamogale*, in addition to the original *P. velox* Du Chaillu, appear to have been distinguished. These are *P. allmani* Jentink (1895), based on Allman's detailed description (*loc. cit.*) of a specimen preserved in spirits from Old Calabar, published some twenty-six years before. The second, *P. velox argens* Thomas, was added in December 1915, on the basis of two specimens from the Upper Congo. The large series of specimens collected by the American Museum Congo Expedition demonstrates that the characters relied upon for the discrimination of these two forms are without value and, for this reason, are subjected to comment.

As shown in the collectors' field notes on this species the genus *Potamogale* has a wide geographic range, and hence might be expected to have developed local phases. It is not the purpose of these remarks to discredit such a reasonable probability but merely to show that the evidence presented for the two forms above cited is far from adequate. Unfortunately, little material is available for direct comparison with that from the Upper Congo region, but the latter emphatically shows the trivial nature of the distinctions offered by their describers for the recognition of *allmani* and *argens*. Reference has already been made (p. 5) to the stained condition of the underparts due to treatment of the skins before they were made up. Apropos of this, and in response to my inquiries, the collectors have informed me that "all living or freshly killed specimens they saw had pure white, lustrous fur on the under side, if not soiled by the reddish clay of these regions"; and they add that "some of their own skins from the same places, when unpacked, were yellowish, due to a difference in the method of preservation." They also state that they "noticed that in many old, flat skins or portions of them from the same localities, which they saw in the possession of Europeans and natives, the originally white area was always yellowish or brown." It is also well known that in museum specimens the white underside of mammals long stored are apt to turn yellowish from fatty matter retained in the skin, or from other causes, and therefore are unsatisfactory as standards of comparison with freshly collected material.

While *Potamogale* is a rather common animal in its native haunts, it is one of the rarest in collections and, when present, is doubtless not safely comparable with freshly killed specimens.

Potamogale allmani was proposed on the basis of two (in part hypothetical) distinctions: (1) the presence of 36 teeth (owing to the immaturity of the specimen) instead of 40; (2) the "brownish yellow" instead of white underparts, due to discoloration by the preservative. *P. velox argens* was described from two apparently normal specimens in which the white of the underparts reached "higher up on the sides" of the body and on to the under surface of the basal portion of the tail than in *P. velox*, which features a large amount of topotype material shows to be inconstant and merely individual. Consequently *allmani*[1] and *argens* cannot be considered as entitled to recognition.[2]

It is hardly necessary to add that many forms, species as well as subspecies, have a similarly unsatisfactory basis, as they rest on slight differences shown by single specimens, or on characters of trivial importance. Their confirmation, it is obvious, rests on a comparison of adequate series of topotype material with similar series of their near allies; and the author who would discard them without such resources would take great risks, notwithstanding his strong conviction that the forms in question are merely names.

ERINACEIDÆ

STATUS OF *Erinaceus albiventris* AND *E. pruneri* WAGNER

The *Erinaceidæ* are represented in the Lang-Chapin Congo Collection by nine specimens (skins with skulls), all from Faradje except a third-grown female from Garamba, a nearby locality. They comprise three adult females and six young, from one-third to one-half grown, and unquestionably represent two distinct species, differing in important cranial characters and in external features. Both belong to the section of the family in which the hind feet are four-toed. Owing, however, to the unsatisfactory original descriptions of the first-named members of this group, and to lack of proper material for direct comparison with the Lang-Chapin specimens, their determination has been difficult. Thanks to the authorities of the Museum of Comparative Zoölogy at Harvard University and of the United States National Museum at Washington, I have in hand 14 additional specimens of the group with 4-toed hind feet, making 23 in all, representing five easily recognizable forms. While their relationships *inter se* are obvious, the names properly applicable to the two forms from Faradje have raised a serious question of nomenclature. One of them should apparently be referred to *E. albiventris* Wagner, as that name has of late been employed, but which of them should be so recognized is indeterminable. This raises the further and more fundamental question of the availability of this name, considered with relation to its origin and history.

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[1] In respect to the status of *P. allmani*, cf. Leche, who in 1907 (Zoologica, XX, Heft 49, pp. 6 and 129, footnote 1) regarded it as only "ein jugendliches Individuum" of *P. velox*.

[2] See above (p. 5) the citation of Grandidier's paper on the Paris Museum series of *Potamogale*

As is well known, Wagner, in 1841, described as new two species of *Erinaceus* (*albiventris* and *pruneri*) on consecutive pages of the same work,[1] for neither of which was given a definite type locality. *Erinaceus albiventris*, the first in sequence of the two species, was based on a single specimen obtained from a dealer, who stated that it was found in a collection from India ("befand er sich unter einer Sendung indischer Thiere"), Wagner himself saying: "Die Heimath kann ich nicht genau bestimmen." The original description of the species was inadequate, merely indicating that it had, like many other species of *Erinaceus* now known, white underparts, parti-colored spines, and other features of no distinctive significance. In later references[2] to the species he stated that the hind feet have only four toes. This fixed the "Heimath" as Africa, inasmuch as no species of this genus having 4-toed hind feet are known to occur elsewhere. Fortunately, the type remained available for examination by later investigators, confirming its African origin. *Erinaceus albiventris* Wagner thus became a "blanket name" for all the African species of *Erinaceus* with 4-toed hind feet. Various forms of the group later became segregated, one after another, under distinctive names as species, and the name *albiventris*, by some authors, was restricted (apparently rather informally) to a Sudan form.[3]

Erinaceus pruneri Wagner, synchronous in publication with his *E. albiventris*, was based on specimens received from Dr. Franz Pruner, from a locality not definitely stated in the original description, nor in Wagner's later references to the species,[4] where he gives its distribution as "Sennaar, nach Sundevall auch am Senegal." It is to be noted that he synonymized (in 1842 and 1855) *E. heterodactylus* Sundevall, based on specimens from the Bahr el Abiad (White Nile), Sennaar, with his *E.*

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[1] 1841, 'Schreber's Säugthiere,' Suppl., II, pp. 22 and 23.

[2] 1843, Wiegmann's Archiv für Naturg., IX, 2 Bd., p. 27; 1855, 'Schreber's Säugthiere,' Suppl., V, p. 587.

[3] Thomas and Wroughton, in describing their *Erinaceus spiculus*, from near Lake Chad, in 1907 (Ann. Mag. Nat. Hist., (7) XIX, p. 371), made comparison with "the Soudanese *albiventris*," and further state: "The nearest neighbors of *spiculus* are *albiventris*, Wagner, from the Soudan and *Adansoni*, Rochebrune, from Senegal."

[4] 1855, 'Schreber's Säugthiere,' Suppl., V, p. 587.

pruneri, a course followed by apparently nearly all subsequent authors. But not by all, since von Heuglin[1] in 1867 gave a list of the species of *Erinaceus* occurring in "Nordost Afrika" in which he included: "*Erinaceus pruneri* Wagner. Aus dem Sennaar." And Fitzinger[2] recognized it as not only distinct from *albiventris* but as the type and only species of his genus *Peroëchinus.* In the original description of *pruneri* it is stated merely that the specimens on which it was founded came in a collection of mammals sent by Dr. Pruner from "Kairo." It is known, however, that Dr. Pruner visited the Upper Nile region and there collected specimens of hedgehogs that were sent to Wagner,[3] among them those on which *pruneri* was originally based.

It may be noted further that Sundevall, about the same time (see below, p. 12), described his *Erinaceus heterodactylus*,[4] a species having 4-toed hind feet, based on specimens collected by Dr. Hedenborg in "Sennaar," and that this species has always been synonymized with *E. pruneri* by subsequent writers, both forms coming from "Sennaar." As both have been referred by most authors to *E. albiventris*, it may be that this fact has had an influence in the recognition of Sudan as the type region of *albiventris* (or, more definitely, Kordofan, in the case of *pruneri*).

To follow further the history of *E. albiventris*, from a geographic point of view, Fitzinger, in 1867,[5] gave its Vaterland as "nicht mit Sicherheit bekannt, wahrscheinlich aber Ost-Indien," and that of *pruneri* as Kordofan. Dobson, in 1882,[6] gave the range of *albiventris* as "Northern Tropical Africa (Senegambia, Sennaar)," and Anderson in 1895,[7] as extending from "Senegambia across Central Africa, southwards to Uganda and northwards to Somaliland." In 1902,[8] he stated: "The specimen upon which Wagner founded this species [*Erinaceus albiventris*] came, in all probability, from Senegambia,"[9] and adds: "The Nile Valley and East African specimens . . . may be more definitely registered as *Erinaceus albiventris* subsp. *pruneri*." Again he says, later on the same page, referring to *albiventris:* "This species is found to the south of Khartum," and "ranges into Somaliland and as far south as Kilima-nyaro." Within this region, since 1902, two forms (*E. hindei* Thomas and *E. albiventris sotikæ* Heller) in addition to *pruneri* have been recognized,[1] and two more are added in the present paper, both from Faradje, northeastern Belgian Congo.

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[1] 'Beitr. zur Fauna der Säuget. N. O. Afrika,' p. 22.

[2] 1867, Sitzungsb. math. nat. Cl. Akad. Wiss. Wien, LVI, p. 126.

[3] Cf. Anderson's 'Mammals of Egypt,' 1902, p. 162.

[4] 1841, Sven. Vet. Akad. Handl. Stockholm, (1842,) p. 227.

[5] Sitzungsb. math. nat. Cl. Akad. Wiss. Wien, LVI, p. 856.

[6] 'Monograph of the Insectivora,' p. 11.

[7] Proc. Zoöl. Soc. London, 1895, p. 420. Anderson included under *Erinaceus albiventris E. pruneri* Wagner, *E. heterodactylus* Sundevall, *E. adansoni* Rochebrune. He added: "This species [*albiventris*] has been obtained at the following localities: Senegal; Saint Louis; Cape Verd; Joal; MacCarthy's Island, River Gambia [collectively = range of *E. adansoni*]; Accra, Fantee; Porto Seguro, Togo; Gaboon; Kitui, Ukamba [type locality of *E. hindei* Thomas, 1907]; Tabora; Kasé; Kilima Njaro; Wakilomi, District of Maka; Central Somaliland; Sennaar [*E. heterodactylus*]; Kordofan [*E. pruneri*]; and region of Upper Nile."

[8] 'Mammals of Egypt,' p. 164.

[9] This statement, doubtless, was based on his personal examination of the type in the Munich Museum, as he states in another connection (1895, Proc. Zoöl. Soc. London, p. 414): "I may mention that I have examined all the Hedgehogs preserved in the Museums of Paris, Frankfort on the Main, Munich, Berlin, and London, and . . . some of the specimens described by Fitzinger in the Vienna Museum."

As stated above (p. 9, footnote), Thomas and Wroughton in 1907, in describing their *Erinaceus spiculus*, referred to Sudanese specimens as typical of *E. albiventris*. In view of the complications of the case, it seems to me preferable to place *Erinaceus albiventris* permanently in the list of unidentifiable species, it having no type locality and being specifically unidentifiable from the original description, although the type appears to have been preserved in the Munich Museum.[2] Senegal (or Senegambia) and Sudan (or Sennaar), the rival suggested type regions, are far apart, with *E. adansoni* representing the former and *E. pruneri* the latter as well established species. Under this ruling the two forms from Faradje are described as new.

ATELERIX POMEL

Since the foregoing was prepared for the press a paper by Oldfield Thomas, on 'The Generic Divisions of the Hedgehogs' (1918, Ann. Mag. Nat. Hist., (9) I, February, pp. 193–196) has appeared, respecting which a few notes are here appended. The old genus *Erinaceus* is divided by Thomas into five genera, which, with their designated genotypes, are as follows:

1. *Erinaceus* Linné, 1758. Genotype, *E. europæus* Linné.
2. *Æthechinus*, new genus. Genotype, *E. algirus* Duvernoy and Lereboullet.
3. *Atelerix* Pomel, 1848. Genotype, *E. albiventris* Wagner.
4. *Hemiechinus* Fitzinger, 1866. Genotype, *E. platyotis* Sundevall.
5. *Parechinus* Trouessart, 1879. Genotype, *E. micropus* Blyth.

Although each of these groups is represented in Africa, only *Atelerix* and *Æthechinus* come geographically within the scope of the present paper. *Atelerix* was proposed by Pomel (1848) as a subgenus of *Erinaceus*, with the statement "4 dactylus" as the entire diagnosis. No species was referred to it, and no geographic range was indicated for the group. Neither is it indicated whether "4 dactylus" refers to the hind feet or to the fore feet, or to all the feet. It happens, however, that only one species of hedgehog had at that time been characterized as 4-dactylus in the original description of the species. This was *Erinaceus heterodactylus* Sundevall (1841, Sven. Vet. Akad. Handl. Stockholm, p. 227), which is characterized as, among other distinctions, "Pedibus posticis 4 dactylis," which is doubtless the original source of Pomel's "4 dactylus." At about the same date (1841) Wagner described *Erinaceus albiventris* and *E. pruneri* on consecutive pages of the same work, without specifying this character for either species. The first of these (*E. albiventris*) I consider specifically unidentifiable, for reasons already given in the present paper. This is the species now designated by Thomas as the type of *Atelerix*. Wagner, two years later, in his 'Bericht über die Naturgeschichte der Säugthiere während des Jahres 1842' (1843, Arch. für Naturg., Bd. 2, p. 27), claimed priority for his *pruneri* over *heterodactylus* Sundevall, to which he referred the latter as a synonym. He says he received a separate of Sundevall's paper from the editor of the Archiv, and that the volume in which it was printed was issued later, but, as he fails to state when Sundevall's paper was received, or what date it bore, we are left in doubt as to which paper has priority of publication, the date of his own publication being "15. Mai 1841."

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[1] Since this was written Thomas has added a third from Kilimanjaro as *Atelerix kilimanus* (1918, Ann. Mag. Nat. Hist., (9) I, March, p. 232.

[2] As stated above (p. 10, footnote), the type was probably critically studied by Anderson prior to 1895, together with the type of *pruneri*, leading to his assignment of the type locality of *albiventris* to Senegambia, and to his later recognition of *pruneri* as an eastern subspecies of *albiventris*.

In his comment on Sundevall's paper he says that "*E. heterodactylus* Sund. mit meinem *E. Pruneri* identisch ist; auch der hintere Daumen geht diesem wie jenem ganz ab." He says further that he had assumed the absence of the hallux in *E. pruneri* and *E. albiventris* to be the result of an injury and for that reason did not mention it; but, inasmuch as Sundevall had found the same suppression in his *E. heterodactylus*, he now considered it an important character for his *E. pruneri* and *E. albiventris*, to be included in the diagnosis. It is accordingly so included in his later revision of the hedgehogs (1855, 'Schreber's Säugt.,' V, p. 587).

The question of what name the genotype of *Atelerix* should bear is thus somewhat complicated, depending upon priority of publication of the names *E. heterodactylus* Sundevall, under which the expression "4 dactylus" (the sole diagnosis of *Atelerix*) was first employed for a hedgehog, and which was first recognized as a character of *E. pruneri* some two years later. In any case, by the consensus of authorities both names refer to the same species. Furthermore, *Peroëchinus* Fitzinger (1866), without diagnosis, included only *E. pruneri* (with *E. heterodactylus* Sundevall as synonym), which is, therefore, the genotype of *Peroëchinus*. As *Peroëchinus* is a substitute name for, or at all events a pure synonym of, *Atelerix*, it thus determines under the peculiar conditions of the case the genotype of the latter as *E. pruneri*. (Cf. 'Internat. Code Zoöl. Nomen.,' Art. 30, II, *f*.)

In Thomas's synopsis of the hedgehogs, the sole distinctive character of *Atelerix* is: "Hallux absent;" and, so far as I can find, this is the only distinction between *Atelerix* and his new genus *Æthechinus*, defined as: "Coronal parting broad, conspicuous. Posterior palatal shelf broad. Third incisor two-rooted." The last two characters, in comparison with *Erinaceus* (as restricted by Thomas), are both present in *Atelerix;* the first is of less importance, depending upon the stress to be laid upon the words "broad, conspicuous," since in *Atelerix* there is a distinct coronal parting, although less developed than in *Erinaceus europæus* and its near allies.

As shown below (p. 17), the absence of the hallux is not constant, and therefore not an important character, since in different individuals of the same litter of young it may be present or absent, although absent as a rule in a number of forms of the *pruneri* (*heterodactylus ?*)-*adansoni* group, which is distributed over a wide geographical area. I agree with Thomas that both *Atelerix* and *Æthechinus* are separable from *Erinaceus*, *sensu stricto*, but collectively rather than as two generic groups, for which the rule of priority demands the earlier name, *Atelerix*.

The forms referred to *Atelerix* by Thomas are:

1. *albiventris* = *Erinaceus albiventris* Wagner, 1841.
2. *adansoni* = *E. adansoni* Rochebrune, 1882.
3. *hindei* = *E. hindei* Thomas, 1910.
4. *spiculus.* = *E. spiculus* Thomas and Wroughton, 1907.
5. *spinifex* = *Atelerix spinifex* Thomas, March, 1918.
6. *kilimanus* = *A. kilimanus* Thomas, March, 1918.

To which may be added:

7. *hindei sotikæ* = *E. sotikæ* Heller, 1910.
8. *faradjius* = *A. faradjius* (described below).
9. *langi* = *A. langi* (described below).

And *pruneri* = *Erinaceus pruneri* Wagner, 1841 (= ?*E. heterodactylus* Sundevall, 1841), in place of "*albiventris*" as No. 1 of the above list, and also as type of *Atelerix* in place of *albiventris*.

Atelerix faradjius, new species

Type, No. 51006, ♀ ad., Faradje, northeastern Belgian Congo, July 7, 1911; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1660. Topotype (♀ very old), No. 51007.

Represented by two adult females from Faradje, of the so-called "*albiventris*" type.

General coloration of the upperparts strongly yellowish white superficially, the broad light tips of the spines being of this color and nearly concealing the dark subterminal zone. Head in front of eyes, including sides of nose, dull tawny-brown; also ears and feet the same in general effect; a broad frontal band, cheeks, sides of neck, sides of shoulders and forearms, thighs and hind legs, rump and whole underparts uniform dull yellowish white (possibly white slightly stained yellowish); upper surface of fore feet slightly clothed with yellowish-white hairs, hind feet more heavily clothed with longer yellowish-white hairs, through which the pale tawny color of the skin determines the general effect; tail similar in coloration to the feet. Spines broadly tipped (for about 4–5 mm.) with yellowish white (without darker tips); subapical band (about 5 mm.) dark tawny-brown, passing proximally into dull yellowish white on the basal half. Longest head spines about 17 mm. in length, body spines about 15 mm.

Collectors' measurements: total length (type), 249 mm.; head and body, 230; tail, 19; hind foot, 29; ear, 30. Topotype (very old female with greatly worn teeth): total length, 205; head and body, 180; tail, 25; hind foot, 26; ear, 30.

Skull measurements: condyloincisive length, (type) 45.1, (topotype) 43.6; length of nasals, 16.5, 15; palatal length (to front of premaxillæ) 25.4, 24.7; zygomatic breadth, 27.7, 26.3; interorbital breadth, 11.8, 11.5; breadth of braincase, 19.5, 19.9; postglenoid breadth, 22, 20; mastoid breadth, 15.5, 16.5; palatal breadth (outside to outside of m^1), 17.6, 16.8; breadth of rostrum at base of front incisor, 6, 5.4; breadth of palate at ridge behind m^3, 9.7, 8.5; tip to tip of alisphenoid processes, 11.2, 11.3; tip to tip of pterygoids, 6.1, 6.7; length of mesopterygoid fossa, 10.7, 10.2; breadth between pterygoids, 2.8, 2.7; length of upper toothrow (i^1–m^3), 21.5, 21.5; upper molars, 8.1, 8.1; lower toothrow (to tip of i^1), 9.7, 8.2; lower molars, 9.9, 9.8; length of mandible (front of symphysis to posterior border of condyle), 34.5, 34.2; depth, angle to coronoid, 17.7, 16.7.

The skull is large and heavy; the nasals are long and narrow, the premaxillæ greatly extended posteriorly, meeting the frontals and excluding contact of the maxillæ with the nasals; zygomatic arches narrow as in *A. pruneri;* mesopterygoid fossa very broad, the pterygoids and alisphenoids heavily developed and widespreading as in *A. hindei* (the reverse of what is seen in *A. pruneri*[1]); dentition heavy, as in *A. langi* and *A. hindei.*

The pattern of coloration is as in *A. pruneri*, differing from that of *langi* and *hindei* in having the space below the eye white instead of blackish. The spines are as in *pruneri*—short and fine instead of long and coarse, and those of the frontal border not conspicuously lengthened as in the *hindei* group. The general coloration of both spine-tips and hair is more yellowish and less clear white than in *pruneri;* the nose and basal color of the feet and ears is tawny instead of blackish as in *pruneri* and in *hindei*. This however may be subject to considerable variation through seasonal and other conditions.

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[1] The specimen of *A. pruneri* here employed in comparison is No. 14446, Mus. Comp. Zoöl., a young adult male (teeth unworn), collected at Fazogli, Blue Nile, by Dr G. M. Allen and recorded by him (Bull. Mus. Comp. Zoöl. LVIII, p. 342, July, 1914) as *Erinaceus albiventris pruneri.*

Atelerix langi, new species

Type, No. 51000, ♀ ad., Faradje, northeastern Belgian Congo, March 22, 1911; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1544.

Represented by 7 specimens, the type, an old female, and her litter of five young (3 males and 2 females), about one-third grown, taken March 22, 1911, at Faradje, and another third-grown young collected at Garamba, May 1, 1912.

A dark-colored species, allied to *Erinaceus hindei* Thomas of British East Africa.

TYPE.—Upperparts dark brown, the spines over the greater part of the back uniform blackish brown from base nearly to tip, the extreme tips tending to lighter brown or even whitish; front of head, flanks and posterior margin of back lighter than the mid-dorsal area, the spines distinctly whitish-tipped, especially on the lower back where all are conspicuously whitish terminally. Ventral surface white, the white area extending along sides of body, shoulders and forearms, and joining the broad white frontal band between the eyes and base of the ears. A narrow line of dusky brown borders the white band in front, broadening laterally to include the cheeks below the eye and extending forward to the naked portion of the face, which, with the chin, is also dark brown. Upper surface of fore and hind feet dark brown, but much lighter than the cheeks. Ears and tail dull brown, the former nearly naked.

YOUNG.—The five third-grown young differ uniformly from the adult type specimen in the dark markings of the face being more intensely black, in vivid contrast with the clear white frontal band. The upper surface of the feet is also deep blackish brown, as is also the tip of the inconspicuous tail. The spines of the dorsal area are all conspicuously and uniformly tipped with white, through which the blackish brown proximal portion of the spines is more or less visible. The young specimens have a tendency to a narrow blackish median area on the posterior part of the ventral surface, in some of them strongly developed. They agree strictly with the mother in the color pattern, but have the black on face and feet more intense and more sharply defined, and the white or whitish tips to the spines longer. The slightly younger specimen from Garamba is indistinguishable from the Faradje specimens in coloration and details of structure.

Collectors' measurements of the type: total length, 195 mm.; head and body, 175; tail, 20; hind foot, 28; ear, 21.

Skull: condyloincisive length, 43.3; length of nasals, 15.4; palatal length (to front of premaxillæ), 24.3; zygomatic breadth, 29.4; interorbital constriction, 11.7; breadth of braincase, 18.3; postglenoid breadth, 21.7; mastoid breadth, 14.7; palatal breadth (outside to outside of m^1), 17.9; breadth of rostrum at i^1, 6.6; breadth of palate at ridge behind m^3, 8.2; tip to tip of alisphenoid processes, 9.2; tip to tip of pterygoids, 5.4; length of mesopterygoid fossa, 10.5; breadth of fossa between pterygoids, 3; length of upper toothrow (i^1–m^3), 21.3; upper molars, 9; lower toothrow (tip of i_1–m_3), 20.2; lower molars, 10.2; length of mandible (front of symphysis to posterior border of condyle), 33.5; angle to condyle, 17.5.

In pattern of coloration *A. langi* agrees with *A. hindei*, in both the dark color of the face extending over the cheeks, which are white in *faradjius* and *pruneri;* indeed, the series of young specimens of *langi* are almost indistinguishable in external features from a corresponding series of young *sotikæ* (a slightly differential form of *hindei*). The dorsal coloration in both is superficially dark brown in general effect but the single adult of *langi* is much darker than any of the four adults of *hindei* available for comparison,[1] while the white tipping of the spines is conspicuous and uniform in *hindei* and nearly absent in *langi*. The spines in *langi* are blackish brown from tip to base, lacking the light median band present in the *hindei* group. The interaural spines in both are much longer than those of the body, forming a decidedly lengthened frontal crest, absent in the *pruneri* ("*albiventris*") group.

The type skull agrees in general dimensions with those given for the type of *hindei*, but differs from it in the nasals being much longer; the short nasal border of the premaxillæ, with a naso-maxillary junction as long or longer than the nasal contact with the premaxillæ—quite the reverse of the conditions in *hindei*, in which the premaxillæ are "slanted backwards, touching the tips of the frontal processes and shutting off the maxillæ from the nasals." The postpalatal region is also much narrower, the pterygoid and alisphenoid processes weaker and much less everted, thus giving to this region a quite different aspect. All of the 6 young skulls (of which the type is the mother of 5 of them) agree with the type skull in the short naso-premaxillary suture and the long naso-maxillary suture, and the narrow postpalatal region and weak development of its processes.[2]

Of 12 skulls of the *hindei* group (5 of *hindei* and 7 of *sotikæ* [*E. albiventris sotikæ* Heller], the latter all from the Guaso Nyiro River) all but one have the nasal border of the premaxillæ extended posteriorly ("slanted backwards"), and in all but two they nearly or quite reach the frontal processes, the maxillæ not reaching the nasals or barely touching them for usually less than a millimetre.

The skull of the type of *hindei* (a female) appears to have been exceptionally large ("greatest length 44; zygomatic breadth 30 mm."), none of the four adult male skulls before me exceeding a total length of 43 mm., with an average of 42.1, and a maximum zygomatic breadth of 27.6, with an average of 26.7, although the teeth are worn and one (total skull length 41.7) is very old. The author's suggestion that when males are available for examination they would prove to be larger than the type is thus not confirmed by the present material.

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[1] The specimens of *hindei* available for comparison are: Nos. 16096 Mus. Comp. Zoöl., subadult ♂, Upper Ura River; 16097 Mus. Comp. Zoöl.; ad. ♀ (skin only); No. 161699 Nat. Mus., ad. ♂, Kapiti Plains; Nos. 164022 and 164023 Nat. Mus., both ad. ♀, Ulucania Hills; No. 182652 Nat. Mus., very old ♂ (teeth greatly worn), Lololokwi. All the localities are in British East Africa, not far from the type locality of *hindei* (Kitui, about 75 miles southeast of Mt. Kenia). The Mus. Comp. Zoöl. specimens (both *ex* Wulsin Coll.) are labeled *Erinaceus hindei*; the Nat. Mus. specimens, *Erinaceus albiventris hindei*.

[2] In respect to this latter feature comparison is made with skulls of *hindei* from the type region of the species.

The hind feet in the type of *A. langi* show no vestige of a hallux. The slight taxonomic significance of its presence or absence in this genus is well indicated by the series of 6 young specimens of which the type of *langi* is the mother of 5. Of the 6 young ones 3 have a vestigial hallux and the other 3 are without it. It is also much more developed in one of the three in which it is present than in the other two. It is also present in one of the 3 young *sotikæ* specimens (No. 181441 Nat. Mus.), and absent in the other two and in 12 adults of the *hindei-sotikæ* series.

SORICIDÆ

As stated above (p. 2), the shrews of the Congo Expedition were early assigned to Mr. Hollister, of the United States National Museum, for determination, and his report on them was published in this Bulletin in October, 1916.[1] The following statement in respect to the extent and character of the collection is made in the introduction to his paper:

> The shrews collected by Herbert Lang and James P. Chapin on the American Museum Congo Expedition number 183 specimens, of 15 species and 3 genera. Almost one half of the species are new. This is not altogether surprising when it is considered how few shrews have been described from the Congo as compared with other parts of Africa. It nevertheless seems remarkable that five of these new species should be members of the small group of "naked-tailed" *Crocidura* of which only about ten forms were heretofore known. Five forms of *Crocidura* which have been recorded from the general region are not represented in this collection. These are *Crocidura turba turba* Dollman, *C. t. tarella* Dollman, *C. poensis attila* Dollman, *C. boydi* Dollman, and *C. nigrofusca* Matschie. Races of *C. hildegardeæ* and *C. fumosa*, as well as representatives of several west coast species also might reasonably be expected.

In order to complete the record of the Congo collection of insectivores, the shrews obtained are here listed, as determined by Mr. Hollister.

Crocidura nyansæ kivu Osgood

Plate IV

Crocidura nyansæ kivu Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 663, Pl. x, fig. 1 (animal).

Crocidura nyansæ kivu Allen, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, pp. 769–774, figs. 1 and 2 (skull), figs. 5–8 (skeleton), Pl. xcii (animal, from photograph). Skull, skeleton, and external appearance, in comparison with *Scutisorex congicus*.

Specimens, 20: Avakubi, 3 (1 alcoholic); Gamangui, 1; Medje, 16.

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[1] 'Shrews Collected by the Congo Expedition of the American Museum.' By N. Hollister, Bull. Amer. Mus. Nat. Hist., XXXV, pp. 663–680, Pls. vii–xi. October 21, 1916.

Crocidura sururæ Heller

Crocidura sururæ Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 664.

Specimens, 2: Faradje, 1 (skin and skull); Garamba, 1 (alcoholic).

Crocidura lutrella Heller

Crocidura lutrella Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 664.

Specimens, 1: Faradje (skin only).

Crocidura turba nilotica Heller

Crocidura turba nilotica Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV. p. 664.

Crocidura turba nilotica Allen, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, p. 784, Pls. lxxxix and xc (skiagraphs of skeleton, in comparison with skeleton of *Scutisorex congicus*).

Specimens, 4: Faradje, 3 (2 alcoholic); Nala, 1 (alcoholic).

Crocidura caliginea Hollister

Crocidura caliginea Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 664, Pl. vii, fig. 1 and Pl. viii, figs. 1, 1*a* (skull).

"Type, No. 48555, Amer. Mus. Nat. Hist., skin and skull of adult ♀ (teeth moderately worn and basal suture closed) collected at Medje, Belgian Congo, July 8, 1914, by Herbert Lang and James P. Chapin. Orig. No. 2451."

Crocidura jacksoni denti Dollman

Plate II, Figure 1

Crocidura jacksoni denti Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 665, Pl. x, fig. 2.

Specimens, 71: Avakubi, 6; Babeyru, 1 (alcoholic); Bafwabaka, 1; Faradje, 5; Gamangui, 2; Medje, 51; Nala, 3 (alcoholic); Niangara, 2.

Crocidura bicolor Bocage

Crocidura bicolor Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 666.

Specimens, 1: Avakubi (alcoholic).

Crocidura oritis Hollister

Crocidura oritis Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 666, Pl. vii, fig. 2 and Pl. viii, figs. 2, 2*a* (skull).

"Type, No. 48510, Amer. Mus. Nat. Hist., skin and skull of adult ♂ (basal suture closed; teeth moderately worn) collected at Avakubi, Ituri River, Belgian Congo, July 6, 1914, by Herbert Lang and James P. Chapin. Orig. No. 2530."

This species is based on five specimens, four from Medje and one (the type) from Avakubi.

Crocidura latona Hollister

Crocidura latona Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 667, Pl. vii, fig. 3 and Pl. viii, figs. 3, 3*a* (skull).

"Type, No. 48610, Amer. Mus. Nat. Hist., skin and skull of adult ♂ (basal suture closed; teeth moderately worn) collected at Medje, Belgian Congo, March 17, 1910, by Herbert Lang and James P. Chapin. Orig. No. 773."

Besides the type there is a single skin without skull, from Avakubi.

Crocidura ludia Hollister

Crocidura ludia Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 668, Pl. vii, fig. 4 and Pl. ix, figs. 1, 1*a* (skull).

"Type, No. 48566, Amer. Mus. Nat. Hist., skin and skull of adult ♂ (teeth slightly worn and basal suture not closed) collected at Medje, Belgian Congo, May 16, 1914, by Herbert Lang and James P. Chapin. Orig. No. 2366."

There are three specimens of this species in the collection, two from Medje (one the type) and one from Ngayu.

Crocidura polia Hollister

Crocidura polia Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 669, Pl. vii, fig. 5 and Pl. ix, figs. 2, 2*a* (skull).

"Type, No. 48559, Amer. Mus. Nat. Hist., skin and skull of adult ♂ (basal suture closed; teeth moderately worn) collected at Medje, Belgian Congo, July 1, 1914, by Herbert Lang and James P. Chapin. Orig. No. 2442."

Crocidura congobelgica Hollister

Crocidura congobelgica Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 670, Pl. vii, fig. 6 and Pl. ix, figs. 3, 3*a* (skull).

"Type, No. 48512, Amer. Mus. Nat. Hist., skin and skull of adult ♂ (teeth little worn) collected at Lubila, near Bafwasende, Belgian Congo, September 20, 1909, by Herbert Lang and James P. Chapin. Orig. No. 122."

There are only two specimens of this species in the collection, the type from Lubila and a specimen from Medje.

Sylvisorex gemmeus irene Thomas

Sylvisorex gemmeus irene Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 671. Table of measurements of 12 specimens.

Specimens, 19: Medje, 18 (including 4 young in alcohol); Faradje, 1.

Sylvisorex oriundus Hollister

Plate II, Figure 2

Sylvisorex oriundus Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 672, Pl. vii, fig. 7 and Pl. ix, figs. 4, 4*a*; Pl. xi, fig. 1 (animal).

"Type, No. 48554, Amer. Mus. Nat. Hist., skin and skull of adult ♀ (teeth little worn) collected at Medje, Nava River, Belgian Congo, May 20, 1914, by Herbert Lang and James P. Chapin. Orig. No. 2368."

Scutisorex congicus Thomas

Plate III

Scutisorex congicus Hollister, 1916, Bull. Amer. Mus. Nat. Hist., XXXV, p. 673, Pl. xi, fig. 2 (animal). Table of measurements of 15 specimens.

Scutisorex congicus Allen, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, pp. 769–784, figs. 1–8, Pls. lxxxix–xcii. Skull and skeleton (Pl. xci, animal). *Scutisorex* raised to the rank of a subfamily Scutisoricinæ.

Scutisorex (*congicus*) Schulte, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, November 26, pp. 785–792. The lumbar vertebræ of *Scutisorex*.

Specimens, 44: Bafwabaka, 2 (skin and 1 complete skeleton); Medje, 42, including 1 in alcohol and 5 more or less complete skeletons.

The highly specialized vertebral column of *Scutisorex* has been made the subject of two special papers already published in this Bulletin (*loc. cit., supra*), one of them, by the author of the present paper, on the remarkable specialization of the vertebral column—unique, or without a known counterpart, in mammals—with numerous illustrations; the other, by Dr. H. von W. Schulte, on the lumbar vertebræ from the morphogenetic viewpoint. In order to emphasize the taxonomic importance of this surprising specialization the genus *Scutisorex* was raised to subfamily rank under the name Scutisoricinæ. To the first of these papers Mr. Lang contributed several pages of field notes.

MACROSCELIDIDÆ

Rhynchocyon stuhlmanni stuhlmanni Matschie

Rhynchocyon stuhlmanni Matschie, 1893, Sitzber. Gesells. naturf. Freunde Berlin, pp. 66–68. Andundi, Semliki River, two specimens, adult and young.

Rhynchocyon stuhlmanni nudicaudata Lydekker, 1906, Proc. Zoöl. Soc. London, April 1907, p. 995. Mawambi district, Ituri Forest, Belgian Congo. One specimen.

Represented by 5 specimens: Penge, 2 (1 skin and skull; 1 alcoholic), April 21, 1914; Avakubi, 2, November 13, 1913, and May 22, 1914. All are females, of which 2 are adult and 1 with the milk dentition. Also a fœtus in alcohol.

The Museum Collection contains also an unsexed specimen of this form from the Budongo Forests, east of Lake Albert; February 1911.

The collectors' measurements of the two adults are: total length, 515 mm. (Penge), and 501 (Avakubi); head and body, 268, 259; tail, 247, 242; hind foot, 84, 84; ear, 30, 30. Skulls: total length, 69.5 (Penge), —(Avakubi); condyloincisive length, 62.3, 65; zygomatic breadth, 36, 35. They thus agree in measurements with average specimens of *R. s. claudi* from localities farther west, as recorded below (Tables 1–4, pp. 23–26).

This fact has, however, little significance since the range in size of adults of *R. s. claudi* covers all forms of the genus *Rhynchocyon* of which measurements have been published. In coloration they closely resemble extremely dark examples of *claudi*, from which they are not satisfactorily distinguishable. Placed at the end of the dark series of *claudi*, they completely merge with it. It seems preferable, however, to recognize them as a darker geographical race of the same specific group.

Rhynchocyon stuhlmanni nudicaudata Lydekker, however, based on a single specimen from the Mawambi district of the Ituri Forest, seems scarcely entitled to serious consideration. The description indicates that the type was not unlike the dark phase of the *R. stuhlmanni* group, with which the author was at the time wholly unacquainted except through the description of *stuhlmanni*. The "generally dark color and wholly white tail" are not distinctive in view of the variations shown, and described below, in the *claudi* series; nor are there any geographical reasons that would seem to require its recognition, the type locality of *nudicaudata* being less than fifty miles southeast from Penge, in the same environment as the latter, and represented in the present collection by specimens of *stuhlmanni*, while the type of *stuhlmanni* came from a locality equally near that of *nudicaudata*. The characters of naked ears and tail, dwelt upon as important distinctions, have no real significance, as such conditions are not infrequent in the *claudi* series; while a white tail, at least in dry skins, is a prevailing condition. The hairs of the tail are also so minute that they are often apparent only on very close inspection, giving the impression of a naked tail, especially in comparison with examples of the *cirnei* group, with which the author compared his specimen.

Rhynchocyon stuhlmanni claudi Thomas and Wroughton

Plate I; Text Figure 1

Rhynchocyon claudi Thomas and Wroughton, 1908, Ann. Mag. Nat. Hist., (7) XIX, May, p. 370. "Beritio, Welle River."

Rhynchocyon claudi Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, November, p. 470. Medje, 1 specimen; Poko, 12 specimens.

Represented by 105 specimens, of which 99 are skins with skulls; 6 fœtal and young specimens in alcohol, and several skeletons, collected as follows:

Medje, 20: May and August–October 1910; November 8, 1913; March 17–20, 1914.

Nala, 1 (alcoholic): July 1913.

Akenge, 5: September 29–October 19, 1913.

Niapu, 79: November 8–December 26, 1913.

The 99 specimens represented by skins and skulls consist of 56 males and 43 females, of which 76 are adult and 23 more or less immature. The latter range in age from one specimen in which the milk teeth had not pierced the gum to those with the deciduous dentition fully developed (a series of 11 specimens), and the other 12 specimens fully illustrate the transition from the deciduous to the permanent teeth. It has hence seemed desirable to utilize this abundant material for the illustration of the tooth development of this interesting genus of insectivores. (Text figure 1, stages 1 to 8.)

The large series of adults from Niapu (43 males, 25 females) affords the basis for a study of sex, age, and individual variation. In the following tables (Tables 1–3, pp. 23-25) the external measurements, carefully taken by the collectors before skinning, have been combined with three measurements of the skull (total length, condyloincisive length, and zygomatic breadth). Table 1 gives the measurements of the males, Table 2, of the females, and Table 3 is a summary of Tables 1 and 2. In these tables the specimens are arranged in four categories, according to age as indicated by the amount of wear shown by the teeth, the purpose being to determine the influence of age upon the general size of the animal after the permanent dentition has been fully acquired. Table 4 is designed to show the correlation of growth with the tooth development. Of the 18 specimens included in this table, 5 are from Medje and 13 from Niapu, those from Medje being indicated by an asterisk.

Sexual Variation

There is no appreciable difference in size or coloration due to sex. The average total length (tip of nose to end of tail) in 43 adult males is 515 mm., in 25 adult females, 516 mm. The average total length of the skull for the same specimens is, males 68.1, females 68.5; condyloincisive length, males 62.3, females 63.5; zygomatic breadth, males 36.3, females 36.2.

TABLE 1.—EXTERNAL AND CRANIAL MEASUREMENTS OF 43 ADULT MALES OF *Rhynchocyon s. claudi*, FROM NIAPU, BELGIAN CONGO

	External Measurements					Cranial Measurements			
Cat No.	Total Length	Head and Body	Tail	Hind Foot	Ear	Total Length	Condylo-incisive Length	Zygom. Breadth	Condition of Teeth
49442	500	265	235	84	29	64.8	64.1	33.5	Unworn
49443	509	269	240	84	31	67.0	61.6	36.2	"
49444	505	265	240	86	31	67.3	62.1	35.7	"
49445	556	291	265	89	34	67.3	63.5	36.3	"
49446	480	260	220	81	31	65.6	60.7	35.7	"
49447	482	250	232	83	32	67.2	60.9	36.4	"
49448	531	286	245	86	33	66.1	61.4	34.8	"
49456	540	277	263	85	31	68.5	61.5	36.5	"
49458	555	303	252	87	31	——	——	35.6	"
49459	521	281	240	88	30	68.3	62.9	35.3	"
49461	504	277	252	90	31	67.1	63.6	37.5	"
49473	512	275	237	83	31	66.6	62.5	35.0	"
49474	458	260	——	83	31	62.2	61.4	36.9	"
49475	469	244	225	82	31	66.9	60.8	34.3	"
49477	522	273	249	88	31	66.7	60.7	34.4	"
49478	510	278	232	87	31	67.7	62.0	35.0	"
49489	465	242	223	83	30	66.1	61.2	33.6	"
49492	496	259	237	86	31	67.3	61.5	35.2	"
49495	512	270	242	87	30	68.5	62.5	35.6	"
49497	522	274	248	86	30	68.5	62.9	36.8	"
49506	502	259	243	87	31	68.5	63.3	36.0	"
49509	518	274	244	84	30	66.8	61.6	35.7	"
49512	502	267	235	87	30	69.2	62.0	36.6	"
49515	514	275	239	85	31	68.4	63.1	36.1	"
49527	516	262	254	86	29	66.3	62.2	36.3	"
49449	517	271	246	84	31	69.0	61.9	36.4	Slightly worn
49450	535	290	245	88	31	70.8	63.6	37.4	"
49462	527	275	252	90	31	68.3	62.4	36.9	"
49466	508	268	240	88	31	67.9	63.2	——	"
49471	532	279	253	86	33	67.9	62.4	36.5	"
49496	504	269	235	84	30	68.3	61.5	35.6	"
49451	512	266	246	83	33	70.5	63.3	36.2	Much worn
49452	535	287	248	89	31	66.7	63.6	38.0	"
49463	537	273	264	86	32	67.1	63.1	37.1	"
49482	510	267	243	84	32	68.4	62.1	36.3	"
49455	485	261	224	89	32	——	63.0	38.1	Greatly worn
49470	520	291	229	87	32	67.7	63.1	37.9	"
49476	522	273	249	88	31	69.2	62.7	37.2	"
49481	515	270	245	85	29	69.4	62.6	36.5	"
40491	505	270	235	83	29	67.9	61.6	36.3	"
49516	500	262	238	82	30	65.6	60.1	36.5	"
49524	530	274	256	91	32	69.2	65.0	37.5	"

Table 2.—External and Cranial Measurements of 25 Adult Females of *Rhynchocyon s. claudi* from Niapu, Belgian Congo

	External Measurements					Cranial Measurements			
Cat. No.	Total Length	Head and Body	Tail	Hind Foot	Ear	Occipito-nasal Length	Condylo-incisive Length	Zygom. Breadth	Condition of Teeth
49460	532	281	251	85	31	68.4	63.6	36.7	Unworn
49464	530	272	258	86	31	67.6	62.3	34.5	"
49479	529	271	258	85	32	67.6	61.8	34.3	"
49480	516	279	237	88	31	69.5	63.0	36.0	"
49485	525	266	259	84	30	67.9	63.3	36.1	"
49486	522	276	246	89	29	66.9	62.1	——	"
49487	523	274	249	87	32	68.0	63.5	36.5	"
49488	514	276	238	85	30	68.4	63.7	35.4	"
49490	535	283	252	84	29	66.1	62.2	36.6	"
49500	522	277	245	85	30	68.8	62.6	36.1	"
49504	517	262	255	85	31	68.8	63.6	34.2	"
49507	511	270	241	86	31	67.5	61.9	33.6	"
49511	530	277	253	87	30	70.6	63.3	36.7	"
49526	513	272	241	86	31	68.7	63.7	35.6	"
49502	512	271	241	86	31	67.6	62.5	35.8	Slightly worn
49508	492	255	237	81	31	66.4	61.3	35.4	"
49453	517	277	240	85	31	68.5	63.1	36.5	Much worn
49469	528	293	235	87	31	70.6	64.0	36.7	"
49483	539	294	245	86	31	69.6	63.6	35.3	"
49494	511	266	245	87	31	69.2	63.1	37.4	"
49501	540	292	248	87	31	68.0	63.5	37.0	"
49503	520	278	242	85	32	71.1	64.8	37.4	Greatly worn
49454	532	285	247	86	31	69.0	63.3	36.8	"
49472	505	272	233	83	32	68.8	61.8	35.7	"
49525	499	273	226	83	33	69.1	64.0	36.2	"

TABLE 3.—SUMMARY OF MEASUREMENTS OF 43 MALES AND 25 FEMALES GIVEN IN TABLES 1 AND 2

		External Measurements						Cranial Measurements		
Condition of Teeth		Sex and No. of Spec.	Total Length	Head and Body	Tail	Hind Foot	Ear	Total Length	Condylo-incisive Length	Zygom. Breadth
Unworn	Avg.	♂25	508.0	269.7	240.5	85.4	30.8	67.2	62.1	35.6
"	Min.	♂25	458	242	220	81	29	64.8	60.7	33.5
"	Max.	♂25	556	303	265	90	34	69.2	64.1	37.5
Slightly worn	Avg.	♂ 6	519.3	274.0	245.3	86.1	31.6	68.9	62.5	36.5
"	Min.	♂ 6	504	266	235	83	30	67.8	61.5	35.6
"	Max.	♂ 6	535	290	253	90	33	70.8	63.6	37.4
Much worn	Avg.	♂ 4	523.5	273.2	250.2	85.5	32.0	68.2	63.0	36.9
"	Min.	♂ 4	510	266	243	83	31	66.7	62.1	36.2
"	Max.	♂ 4	535	287	264	89	33	70.5	63.6	38.0
Greatly worn	Avg.	♂ 7	511.0	271.6	239.4	86.3	30.7	68.2	62.6	37.1
"	Min.	♂ 7	430	261	224	82	29	65.6	60.1	36.3
"	Max.	♂ 7	485	291	256	91	32	69.4	65.0	38.1
Unworn	Avg.	♀14	522.8	278.6	248.6	85.9	30.6	68.1	64.2	35.5
"	Min.	♀14	511	262	237	84	29	66.1	61.8	33.6
"	Max.	♀14	535	283	259	89	32	70.6	63.7	36.7
Slightly worn	Avg.	♀ 2	502.0	263.0	239.0	83.5	31.0	67.0	61.9	35.6
"	Min.	♀ 2	492	255	237	81	31	66.4	61.3	35.8
"	Max.	♀ 2	512	271	241	86	31	67.6	62.5	35.4
Much worn	Avg.	♀ 5	525.8	281.7	242.5	86.2	31.2	69.5	63.5	36.7
"	Min.	♀ 5	511	266	235	85	31	68.0	63.1	35.3
"	Max.	♀ 5	540	294	248	87	32	71.1	64.0	37.4
Greatly worn	Avg.	♀ 4	512.0	276.7	235.3	84.0	32.0	69.0	63.4	36.2
"	Min.	♀ 4	499	272	226	83	31	68.8	61.8	35.7
"	Max.	♀ 4	532	285	247	86	33	69.1	64.8	36.8

TABLE 4.—EXTERNAL AND CRANIAL MEASUREMENTS OF 12 IMMATURE SPECIMENS OF *Rhynchocyon stuhlmanni claudi* FROM NIAPU AND MEDJE,[1] BELGIAN CONGO

	Cat. No.	External Measurements						Cranial Measurements			Condition of Upper Teeth
		Sex	Total Length	Head and Body	Tail	Hind Foot	Ear	Total Length	Condylo-incisive Length	Zygom. Breadth	
	*49434	♂	170	51	119	52	15	39.6	36.4	——	Teeth not through gums.
	*49427	♀	332	174	158	68	20	47.0	41.4	——	Cusps of dp^2, ^{3}, ^{4}, canines and incisors just appearing.
	*49518	♀	368	181	187	73	23	51.0	44.5	——	Same as No. 49427.
	*49413	♀	382	196	186	75	25	53.5	50.3	——	Slightly more advanced than No. 49427.
	49523	♀	371	211	160	78	26	50.0	46.5	——	Entire milk set of 6 teeth fully developed.
	*49436	♀	440	227	213	82	27	58.8	——	——	Same as 49523.
Entire milk set present	49513	♂	423	223	200	81	26	57.6	52.3	29.7	Milk teeth only.
	49514	♀	463	238	225	80	28	60.4	54.9	29.2	
	49510	♀	470	242	228	80	28	62.1	56.3	31.2	
	49493	♂	457	231	226	82	28	65.2	57.8	31.3	
	49499	♀	455	247	245	85	30	66.1	60.1	34.1	
	49498	♀	483	243	240	82	30	63.6	57.5	32.6	Milk teeth+m^1 and p^1 half up.
	49465	♂	502	255	247	86	29	67.9	61.8	34.9	Milk teeth+m^1 fully up.
	49467	♂	502	274	228	87	31	66.3	60.7	34.9	
	49505	♀	502	261	241	—	30	66.7	61.6	33.3	Milk teeth + m^1 fully up and m^2 can be seen.
	49484	♀	515	268	247	86	30	65.8	60.7	34.4	Milk teeth + m^1, m^2 one-third up, and p^4, p^3, and p^2 can be seen under their milk predecessors.
	49468	♂	494	261	233	85	29	65.4	60.5	34.7	Same as No. 49484 in which, however, milk canines are still preserved.
	49488	♂	514	276	238	85	30	68.5	63.6	35.5	M^1, m^2, p^4, p^3 fully up, p^2 and canine seen beneath their milk predecessors.

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[1] An asterisk (*) is prefixed to the catalogue number of those from Medje.

Age Variation

Coloration.—Coloration is only slightly affected by age. In young specimens in the first pelage, the tones are practically the same as in adults; the light and dark markings of the upperparts are not quite so sharply defined, but the pattern is strictly the same. In very old specimens the dorsal pelage has sometimes a more grayish cast than is usual in younger animals, due perhaps to less prompt renewal. As will be shown later, the wide variation in color seen in a series of specimens has no relation to sex or age.

Size.—Tables 1–4 have been compiled with special reference to the effect of age upon the general size of the animal and upon the size of the skull, since species and subspecies are sometimes based on adolescent specimens, and frequently on "young adults." Table 4 shows that in 6 specimens having only the full deciduous set of teeth the total length (tip of nose to end of tail vertebræ) ranges from about 440 to 460 mm. as compared with the average adult length of about 515 mm., and a condyloincisive length[1] of about 50 to 60 mm., as compared with about 63 mm. in middle-aged specimens. During the period of the replacement of the deciduous by the permanent teeth the size increases to about the minimum for adults, the total length averaging about 500 mm. and the condyloincisive length about 60 mm.

The average total length of the animal in 38 specimens (24 males, 14 females) with unworn teeth is 514 mm. (males 509, females 524); average condyloincisive length of skull, 62.3 (males 62.1, females 62.8).

In 8 specimens (6 males, 2 females) slightly more advanced in age (the teeth appreciably worn) the average total length is 516 mm. (males 520, females 501); condyloincisive length of skull, 62.3 (males 62.5, females 61.5). In this case the number of specimens is too small to be satisfactory, especially in relation to sex difference in size.

In 9 specimens (4 males, 5 females) still older (teeth much worn), the average total length is 524.4 mm. (males 523, females 527); condyloincisive length of skull, 63.27 (males 63.25, females 63.5). Again the series is too small for satisfactory results, but is not wholly without interest.

The old-age (senile) series is represented by 11 specimens (7 males, 4 females). The average total length is 512 mm. (males 511, females 514); condyloincisive length, 62.9 (males 62.6, females 63.5).

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[1] The condyloincisive length is a better standard than total length of skull, the ossification of the nasal cartilage being a variable element, sometimes terminating at or a little behind the tip of the premaxillæ but usually extending several millimeters beyond this point. Hence, total length and occipitonasal length are undesirable measurements for skulls of *Rhynchocyon*.

The results of the foregoing analysis of variation in size as affected by age and sex are collated in the following tabular résumé (Table 5).

The results derivable from the above tabulation would possess greater interest if the number of specimens in each of the six categories had comprised a more nearly equal number of specimens—if each had been as large as in Table 3. It seems safe to assume (1) that size is not diagnostic of sex, although the above statistics indicate a slight superiority for the females. The largest specimen of the entire series is a "young adult" male (No. 49445), with a total length of 556 mm., a tail length of 265, length of hind foot 89, and condyloincisive length 63.5, dimensions not reached by any female, except the skull length in a few old females, which again is exceeded by a few old males. (2) There is a slight increase in size, both externally and of the skull, in the old-age period, but insufficient to antagonize the selection of young adult specimens as types of new forms, since individualism in any age class more than bridges the differences that can properly be ascribed to age after approximate maturity is reached.

TABLE 5.—RELATION OF AGE AND SEX TO SIZE

Condition of Teeth	No. of Specimens	Total Length Animal	Condylo-incisive Length. Skull
1. Entire milk set only	6	451	56.3
2. Entire milk set plus $\frac{m^1}{m_1}$ more or less developed	5	501	60.5
3. Permanent set, unworn	38	514	62.3
	24 ♂	509	62.1
	14 ♀	524	62.8
4. Permanent set, slightly worn	8	516	62.3
	6 ♂	520	62.5
	2 ♀	501	61.5
5. Permanent set, much worn	9	524.4	63.27
	4 ♂	523	63.25
	5 ♀	527	63.5
6. Permanent set, greatly worn	11	512	62.9
	7 ♂	511	62.6
	4 ♀	514	63.5

Individual Variation

Size.—As already noted incidentally above, the variation in total length (tip of nose to end of tail) in the series of 25 young males with unworn teeth from Niapu covers the entire range of variation in the whole series of the 68 adults from Niapu, all of which were taken within a period of about six weeks in November and December of the same year, and all within a radius of about six miles in strictly uniform environment. Leaving out of consideration a single specimen (No. 49474, ♂), obviously a dwarf, the average total length is 510 mm., the two extremes being 465 and 556, a difference of 91 mm., 17 per cent of the mean. Even this is exceeded in the old-age series of 7 males, where the range is 19.6 per cent. This illustration applies equally to length of tail, where the range of variation is 18.7 per cent of the mean, but not to hind foot and ear, where the range is respectively 10 and 2 per cent. It is also much less in the skull, in which the mean condyloincisive length in the 25 young adults in question is 62.1 mm., and the extremes 60.7 and 64.1, and the difference 3.4 mm., or only about one-half of 1 per cent. This, however, is nearly equal to the variation due to age, where the average condyloincisive length in the old-age series of 11 specimens is 62.9 mm. (minimum 60, maximum 65 mm.). The variation in zygomatic breadth parallels that of the skull length.

Coloration.—*Rhynchocyon s. claudi* may be said to have, in a general way, a light phase and a dark phase of coloration, but a large proportion of the specimens in the present large series are in such varying degrees intermediate that no line of demarcation can be even approximately assigned. As the extremes of light and dark specimens belong to the same sex and prove to have been taken on the same day at the same place, it must be assumed that this wide range of color variation is purely individual. Yet, should single specimens of the extremes of the light and dark types of coloration be received by a systematist from even the same locality, he might be pardoned for considering them as nameable forms. Some of the East African forms of *Rhynchocyon* have been found to be notably prone to melanism, but among the hundred examples of the *claudi* type collected by the American Museum Congo Expedition not one shows such tendency, notwithstanding the large amount of color variation they present.

The light or reddish phase (Plate I, upper figure) may be indicated as follows, beginning with the ventral area:

Chin, throat, fore neck and pectoral region entirely and nearly uniform buff, varying from pale buff to ochraceous buff (in different specimens), abruptly constricted at axillæ and pectoral area to about the median third or fourth of thorax, thence expanding to cover the lower abdomen and inside of thighs, usually darkest on middle of breast and lighter on throat, middle of thorax and mid-lower abdomen. In extreme specimens this portion of the ventral surface has a decided rufous tone. Sides of head from base of rostrum, expanding upward to enclose the ears, sides of neck and sides of body to base of tail (encroaching deeply on sides of abdomen and nearly meeting over thorax), brownish rufous or chestnut slightly varied with black-tipped hairs. Top of head and mid-region of back to base of tail more varied with black-tipped hairs, which from the withers posteriorly take the form of four longitudinal blackish bands, which from middle of back to base of tail are broken by four or six transverse rows of whitish spots, which vary in tone (in different specimens) from clear white to pale buffy white. Over this area the general effect is that of alternating transverse rows of rather sharply defined black and white spots, about five of each being rather distinctly defined, with an additional posterior row of two white spots at the base of the tail, and an ill-defined anterior row of small, less distinct, whitish spots. There is also a tendency to an additional lateral row of indistinct or subobsolete whitish or pale buffy spots on each side of the usual four distinct median rows of spots. Counting all the rows of white or whitish spots they form six longitudinal rows, the outer rows separated from the others by dark chestnut instead of blackish intervals.

No. 49463, Niapu, November 24, 1913, adult ♂, and No. 49477, Niapu, December 1, 1913, adult ♂, may be taken as typical of the light or reddish phase. In general tone No. 49477 is lighter, with the dorsal spots clearer white, than No. 49463.

The dark phase (Plate I, lower figure) may be thus indicated:

Light portion of the underparts much paler, or faintly yellowish white; the sides of head, neck, and body dull dark brownish, almost without trace of rufous except around ears and on sides of neck; top of head and mid-region of back grizzled yellowish gray with most of the hairs broadly black-tipped; the back from the posterior part of thoracic region to base of tail with deep black predominating, the whitish spots reduced in size and usually rather clear white, and the longitudinal and transverse bands indistinct or blended into a black or blackish general ground color, the black most concentrated along the median line.

This phase is typically represented by No. 49487, Niapu, December 4, 1913, adult ♀. No. 49490, adult ♀, same locality and date, has more rufous suffusion on sides of neck, nape, and shoulders.

Each phase is typically represented by both males and females taken on consecutive days, or sometimes on the same day, at the same locality. Other specimens collected actually or approximately at the same date and place, equally representative of both sexes and strictly comparable as to age, fill every gradation between the two extremes. Hence the types of coloration above described can scarcely be considered as representing respectively a definable red and dark phase, but merely the extremes of a wide range of purely individual variation, shown in the accompanying colored plate.

CRANIAL VARIATIONS.—Matschie[1] and others apparently believe that the relative length of the frontal and nasal sutures is of specific value in *Rhynchocyon*. Specimens of *Rhynchocyon s. claudi* in our series show that the frontal suture may be as long as, or longer or shorter than, the nasal suture, and in some cases one of the nasals is fully 4 mm. shorter than the other. The following measurements[2] illustrate variations in specimens taken in the same locality at Niapu:

		Frontal Suture	Nasal Suture
No. 49445	♂	24 mm.	24 mm.
49479	♀	27.25 mm.	19 mm.
49443	♂	27 mm.	20 mm.
49459	♂	28 mm.	20.5 mm.
49448	♂	22 mm.	25 mm.

Rhynchocyon claudi Thomas and Wroughton was based originally on a specimen in the light or reddish phase of coloration from Beritio, near Angu, on the Uele River. Later a single specimen from Medje and twelve others from Poko were referred to this species by Thomas. The present collection contains 20 specimens taken at Medje, 5 collected at Akenge, and 79 at Niapu. The two last-named localities are within about thirty miles of Medje and Poko and have the same environment. There can be little doubt therefore of the correct reference of all these specimens to *R. s. claudi*.

DENTITION OF *Rhynchocyon*

Text Figure 1

The present large series of skulls of *Rhynchocyon s. claudi* affords material fully disclosing the character of the dentition of *Rhynchocyon* from its early stages to old age. In the youngest skull (No. 49434—see Table 4, p. 26) of the series the teeth are wholly enclosed in the gum; in a slightly older specimen (No. 49427) the tips of the principal cusps of the deciduous teeth (canines and premolars 2, 3, 4) have broken through. Other specimens, more advanced, show the gradual development of the milk teeth and the order of their displacement by permanent teeth. In a succeeding table (Table 5, p. 28) measurements are given to show the correlation of the size of the individual with tooth development, from the stage just prior to the appearance of any of the teeth above the gum to full maturity of the permanent set. Several stages of development are also shown in the accompanying text figure (Stages 1–8).

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[1] 1893, Sitzber. Gesell. naturf. Freunde Berlin, p. 66

[2] Other cranial variations are indicated in the tables of measurements and need not be especially emphasized, as they present no unusual features

Deciduous Dentition

The milk dentition, strictly construed, consists of 24 teeth: $I\frac{1-1}{3-3}$, $C\frac{1-1}{1-1}$, $P\frac{3-3}{3-3}=\frac{10}{14}=24$. The first premolar ($p\ \frac{1-1}{1-1}$) is not present till later and has no successor.

UPPER OR MAXILLARY SERIES.—The single upper incisor (i^3 by position) is a minute spicule inserted at the extreme posterior border of the premaxilla and has no successor. Although small and frail, it often persists through life, being frequently present in the senile stage. In 46 adult skulls, taken at random for the investigation of this point, 15 (33 per cent) were found to retain one or both upper incisors, both being present in 6 skulls and one in each of 9 skulls, most frequently on the right side. When these teeth are absent their alveoli often remain, indicating the recent presence of the teeth.

The canine is a small bicuspid tooth, with a slender-pointed central cusp, and a small slender-pointed posterior cusp, about one-third as high as the main cusp. The canine is shed at the same time as the premolars, but its successor is long in maturing, and, when fully developed, is long, slender, and saber-like. The second, third, and fourth premolars (dp^2, dp^3, dp^4) arise simultaneously. Dp^2 has a basal length slightly exceeding its height, with two pointed cusps, the anterior one considerably exceeding the other in size and height, and a low anterior and a low posterior cusplet, both arising from the cingulum. Dp^3 is subtriangular in basal outline, the anterior half narrow, the posterior broad, with a main central cusp, a smaller one behind it, and a still smaller one in front, on the cingulum. There is also a low, broad postero-internal cusp, and, behind this, a slight cusplet from the cingulum. Of these five cusps, three are external and two internal. Dp^4 is subquadrate and distinctly molariform, with four prominent cusps, the outer much higher than the inner, the four cusps collectively enclosing two deep basin-shaped cavities. There is also an anterior cusplet from the cingulum.

LOWER OR MANDIBULAR SERIES.—The anterior four milk teeth in the lower jaw are all incisiform, similar in size and general form, and have their axes directed forward. The two middle teeth are tricuspid, the first and fourth bicuspid. They are separated from dp_2 by a long convex diastema. The first three incisiform teeth are shed singly at intervals. The three posterior milk premolars (dp_2, dp_3, dp_4) increase successively in size, dp$_2$ being less than half the size of dp$_3$, and dp$_3$ is less than one-third the bulk of dp$_4$. Dp$_2$ has a high-pointed central cusp and a small, low, sharp-pointed one before and behind it, and a cusplet on the posterior cingulum. Dp$_3$ is similar in structure to dp$_2$, but is a much larger tooth. Dp$_4$ consists of two sections, each of which encloses a deep basin from the borders of which arise four cusps, of which two are antero-external, the other two internal, one of which is median and the other posterior. The medio-internal cusp is usually minutely bipointed when unworn.

The above conditions are represented, essentially or exactly, by 7 skulls (Nos. 49523, 49436, 49513, 49514, 49510, 49499, 49493, of Table 4).

Permanent Dentition

The permanent dentition comprises 36 teeth: I^{1-1}_{3-3}, C^{1-1}_{1-1}, P^{4-4}_{4-4}, M $\frac{2-2}{2-2}=\frac{16}{20}=36$. In this enumeration the minute upper incisor is assigned as a permanent tooth, although, as already explained (p. 32), it is often absent in adults, though frequently persisting through life, and has no successor. The first premolar in both jaws has also no successor and is developed later than the other premolars which have successors.

UPPER OR MAXILLARY SERIES.—The canine is a long, slender, laterally compressed, 2-rooted tooth, with a conspicuous longitudinal groove on its antero-internal face. The first premolar (p^1) does not pierce the gum till the milk premolars (dp^2, dp^3, dp^4) are fully developed and functional, and has, as already said, no predecessor. It is a small unicuspid, 2-rooted tooth, about as long antero-posteriorly as high. It is separated from both the permanent canine and the permanent p^2 by diastemata nearly equal in length to the basal length of the tooth. P^2 and p^3 are similar in form to their respective predecessors, from which they differ mainly in larger size. P^4 is more completely molariform than dp^4, and differs from m^1 only in being larger and slightly more quadrate. M^1 is subquadrate, the anterior half of the tooth broader than the posterior half, with higher cusps, which are situated at the four corners of the tooth. M^2 is trigonal, with three cusps, and is about one-third the size of m^2. Thus, in the permanent dentition, the last three maxillary teeth are typically molariform and, on the basis of structure and position, would be classified as molars, but the first one of the three has a milk predecessor.

LOWER OR MANDIBULAR SERIES.—The three permanent incisors all have bifid crowns, are close-set, directed obliquely forward, and differ from their predecessors mainly in their larger size. The canine is a small 2-rooted tooth, separated from i$_3$ and p$_1$ by slight diastemata. Its axis

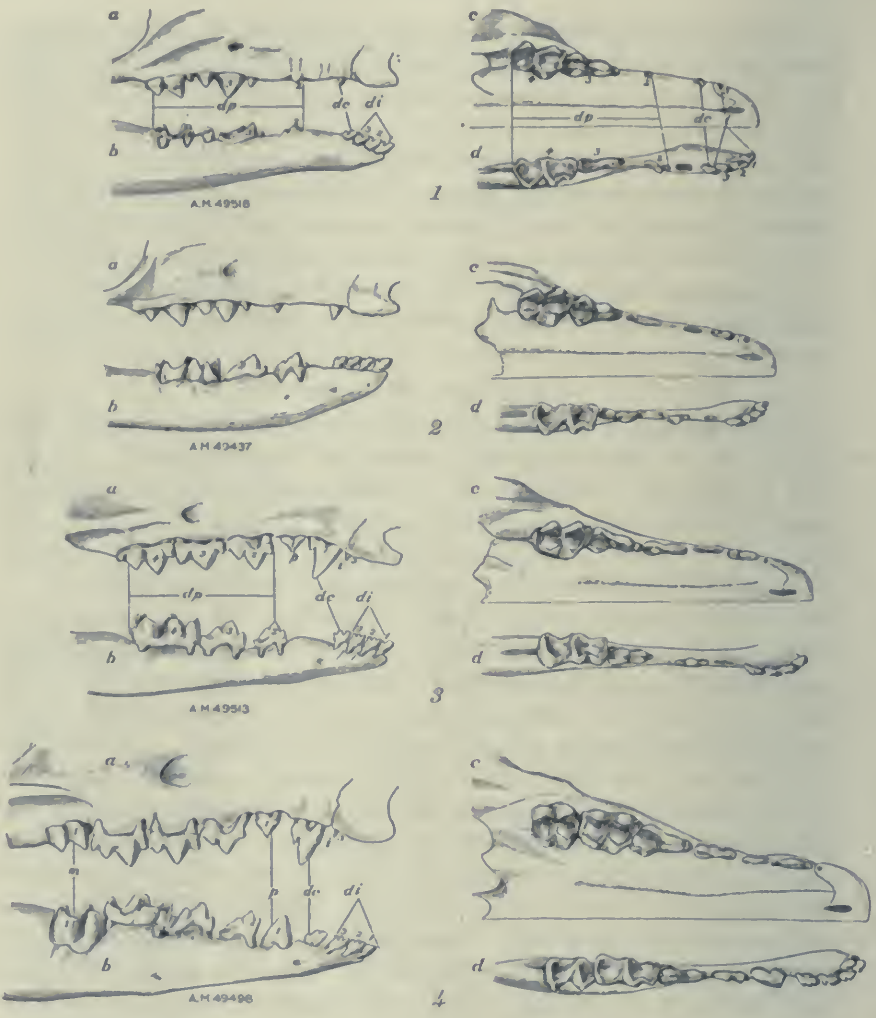

a
b
dp
dc
di
A.M. 49518
c
d
dp
dc
1
a
b
A.M. 49437
c
d
2
a
b
dp
dc
di
A.M. 49513
c
d
3
a
m
p
dc
di
b
A.M. 49498
c
d
4

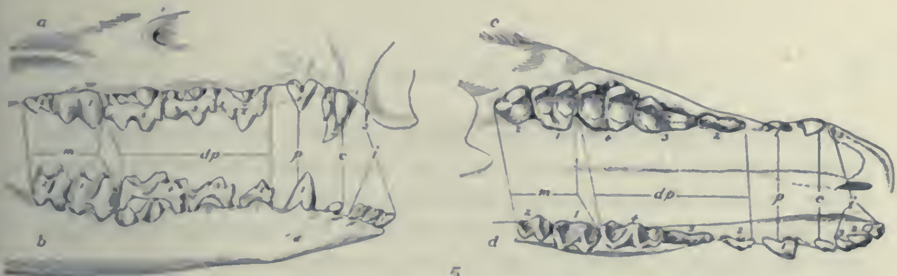
Fig. 1. Development of the dentition in *Rhynchocyon stuhlmanni claudi* Thomas. All ×¾; *a* and *b*, side views; *c* and *d*, crown views. From specimens taken in the Belgian Congo by The American Museum of Natural History Congo Expedition, 1909–1915.

Stage 1. Milk teeth breaking through gums. No. 49518, ♀ juv., Medje, June 3, 1914.

Stage 2. Milk teeth more advanced; alveolus of p^1 fissured. No. 49437, ♀ juv., Medje, September 8, 1910.

Stage 3. Milk teeth fully developed, and p^1 nearly so; convex diastema where p_1 is forming beneath. No. 49513, ♂ juv., Niapu, December 17, 1913.

Stage 4. Upper milk dentition p^1, and crown of m^1 just through gum; lower jaw: milk teeth, p_1 well advanced, m_1 half up, and tip of permanent i_1 in sight. No. 49498, ♀ juv., Niapu, December 6, 1913.



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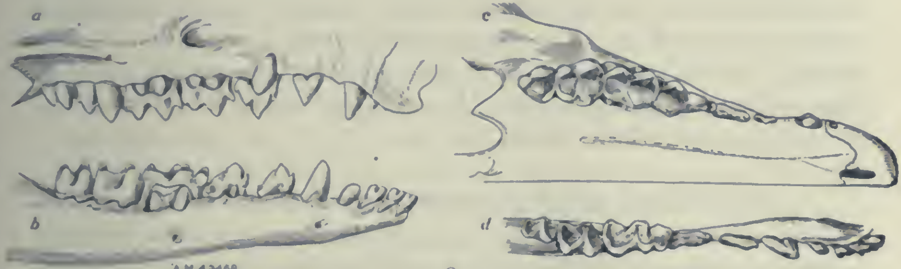

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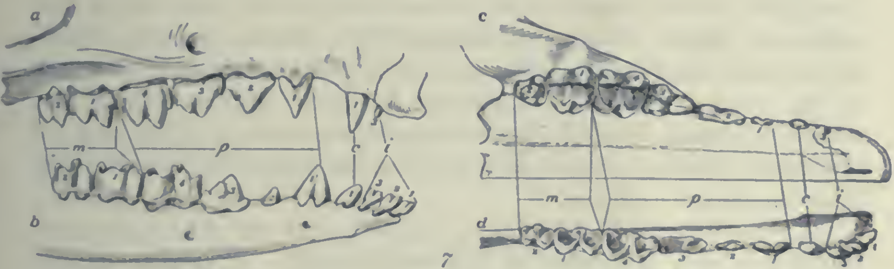

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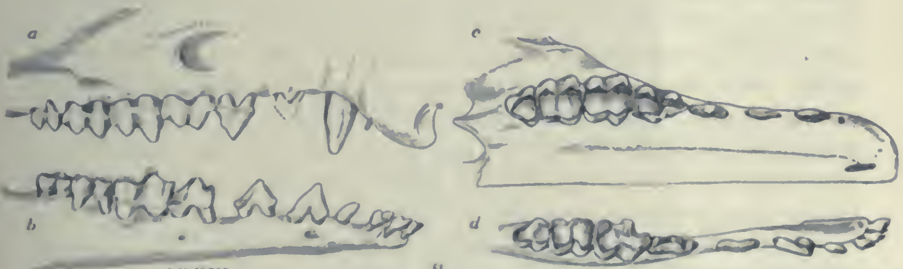

8

(Fig. 1 continued)

Stage 5. First molar fully up and second molar half up in both jaws; permanent premolars visible between the roots of their predecessors; permanent lower incisors and lower canine fully developed. No. 49484, ♀ juv., Niapu, December 4, 1913.

Stage 6. Slightly more mature, the molars being full-grown, but premolars of permanent set still covered by the milk teeth in both jaws; caniniform p_1 nearly mature; upper milk canine has been shed. No. 49468, ♂, Niapu, November 25, 1913.

Stage 7. Mature permanent dentition, but upper canine not fully grown. No. 49486, ♀, Niapu, December 6, 1913.

Stage 8. Senile stage to show wear of teeth. In old age the first premolar becomes greatly worn in both jaws, sometimes only the roots of p^1 remaining. No. 49503, old ♀, Niapu, December 8, 1913.

is directed forward, as is the case with the incisors, which it exceeds but little in size, its blunt-convex crown not rising above the crown surface of the incisors. P_1 is a 2-rooted unicuspid, perfectly caniniform in structure and function; its height is about twice its basal length, or about twice the height of p_2 and p_3, and it is a persistent tooth of the first set. P_2, p_3, and p_4 are respectively similar in structure to their predecessors but more massive. P_4 conforms in plan with the molars except in having an additional cusp on the interior border, making five cusps instead of four as in the molars. It is thus a slightly longer tooth than m_1. The median internal cusp, when the tooth is unworn, is usually minutely bipointed, as in its predecessor. M_1 and m_2 are similar in structure, but m_2 is only about half the size of m_1.

Development and Replacement of the Deciduous Teeth

The condition of the teeth, as seen in the cleaned skull at the stage when the crowns of the last three premolars in each jaw $\left(\frac{dp^2,\ dp^3,\ dp^4}{dp_2,\ dp_3,\ dp_4}\right)$ are fully excluded and the teeth have become functionally effective (skull No. 49513), is as follows. The incisors and canines (both above and below) are, like the last three premolars, fully developed and functional; the extreme tip of p^1 is barely above the alveolar border and would be, in most cases at least, still covered by the gum; dp_2 is not visible but there is a narrow slit at the outer base of the convex diastema between the canine and dp_2; there is also a narrow opening in the alveoli of the future molars, in each jaw.

Upper Teeth.—Later (Fig. 1, Stage 4), after the skull has nearly doubled its size, p^1 attains its full development. P^1 persists without change except by wear, and, later in life, is the first tooth to become inefficient through excessive attrition. After considerable further increase in the size of the skull the crown of the first molar is excluded and, as soon as it has reached functional maturity, is followed by the second molar. Not, however, till m^2 has become fully functional is there any further change, when the crowns[1] of the permanent canine and the permanent premolars (p^2, p^3, p^4) can be seen between the roots of their predecessors, but it is considerably later before the milk premolars are finally shed and their successors are fully developed.

Lower Teeth.—The first change in the milk teeth of the mandible occurs coincidently with the breaking of the crown of m_1 through its alveolus and before the crown surface of the tooth is much above the alveolar border. At this stage (represented by No. 49499) the four incisiform teeth are still unchanged, but the tip of the caniniform p_1 is just above the alveolar plane, or practically at the same stage as m_1. At the next stage (represented by No. 49498, Fig. 1, Stage 4), m_1 is about two-thirds grown but not as yet at full height, and p_1 is evenly keeping pace with it in development. None of the other milk teeth shows any indication of approaching replacement. In skull No. 49428 this molar is fully developed, as is also p_1, but the milk premolars (p_2, p_3, p_4) are still firmly in place, with no trace of their successors between their roots. The first incisor (i_1), however, has been renewed, and the crowns of the successors of i_2 and i_3 can be seen pushing up at their inner bases, and the same condition is also true of the canine. It would seem, therefore, that the renewal of the milk incisiform series just precedes that of the milk premolars. In No. 49484 a somewhat later stage is shown, in which m_1 is not only fully mature but the crown of m_2 has reached about one-half its full height. In this skull (Fig. 1, Stage 5) the permanent canine has attained to about half the height of its predecessor, coming up at its outside base, and the crowns of the milk premolars can be seen between their roots, these four teeth, like the same teeth in the maxillary series, developing coincidently. The permanent incisors and the permanent canine are also now fully matured.

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[1] In skull No. 49428 the crown of the right canine is double, consisting of two equal slender stiles in close contact.

To complete the series of illustrations a figure of the unworn dentition of a youngish adult (Fig. 1, Stage 7) and of an old-age adult (Fig. 1, Stage 8) are here included.

Nasilio fuscipes (Thomas)

Macroscelides fuscipes Thomas, 1894, Ann. Mag. Nat. Hist., (6) XIII, January, p. 68. "N'doruma [Doruma], Niam-Niam country (about 5° N. and 27° 30′ E.)." Based on a young female "having still its milk-dentition in place."

Represented by 30 specimens (28 skins and skulls, 2 in alcohol), collected as follows:

Niangara, 8: November 18–December 19, 1910.

Faradje, 21: February 8, 1910; February 20–May 6 (mostly February 2–March 1), 1911; December 25, 1912; January 3–8, 1913.

Garamba, 1 (in alcohol): March 1912.

Males and females are equally represented. All are adult except 9, which are one-half to two-thirds grown, with the permanent dentition incomplete. These form a series showing all the stages of change from the deciduous to the permanent dentition, confirming Thomas's determination of the dental formula in *Macroscelides*.[1]

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[1] 1890, Proc. Zool. Soc. London, pp. 445, 446. Milk dentition of *Petrodromus* figured, p. 445.

The adult males have a short-haired, glandular pectoral area, the short hairs of which, and the longer enclosing pelage, are cream-color, due possibly to staining. In some males this area has an axial extent of 20 mm. or more and a breadth of 10 mm., thus forming a conspicuous feature of the ventral surface, but it is less developed in females.

The Niangara series, taken at the close of the rainy season, are rather brighter colored—more rufescent and less gray above—than those from Faradje collected some two or three months later. The difference is not wholly constant and may be seasonal, as some specimens of the Niangara series are indistinguishable in coloration from some of the Faradje specimens.

Collectors' measurements of 7 adult males and 10 adult females from Faradje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	204 (200–207)	115 (109–128)	91.3 (84–96)	29.3 (28–31)	21.0 (20–22)
♀	210 (201–224)	120 (114–129)	91.0 (85–99)	29.2 (28–30)	22.2 (20–23)

Skulls, 5 males, 9 females, Faradje series:

	Total Length	Zygomatic Breadth
♂	34.4 (34 –34.7)	17.1 (16.4–18.1)
♀	34.9 (36.6–36.4)	17.4 (16.6–18.1)

The minima are all from rather young adults, the maxima from obviously very old skulls. The females show a slightly larger average size than the males, both in external and cranial dimension.

These specimens agree satisfactorily with the description of the type of *fuscipes* when those corresponding with it in age ("a somewhat immature female. . . having still its milk dentition in place") are considered. Geographical conditions may be taken as confirmatory of this identification, the type locality (Doruma) of *fuscipes* being about 100 miles north of Niangara and some 160 miles west of Faradje and Garamba. These four localities, Mr. Lang assures me, are in regions of similar environment. The present series, if here correctly referred, shows that *Macroscelides fuscipes* Thomas belongs to the genus *Nasilio* Thomas and Schwann[1] (type *Macroscelides brachyrhynchus* A. Smith), the molars being $\frac{2}{3}$. The type of *fuscipes* was so young that it could give no hint of the number of the molars, but it is described as "most nearly allied to *M. brachyurus* Boc.," of which the author says: "Sa mâchoire inférieure porte chaque côté une molaire de plus, onze dents au lieu de dix."[2]

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[1] 1906, Proc. Zoöl. Soc. London, II, p. 578.

[2] Bocage, 1889, Journ. Sci. math. phys. nat. Acad. Madrid, (2) I, No. 1, p. 24, Marco.

Plate I

Rhynchocyon stuhlmanni claudi Thomas and Wroughton. Two males, taken in the same locality within a week, showing an extreme light rufous and an extreme dark phase. Drawn by Charles R. Knight from skins, Amer. Mus. Nos. 49495 and 49477, Niapu, December 1 and 6, 1913.

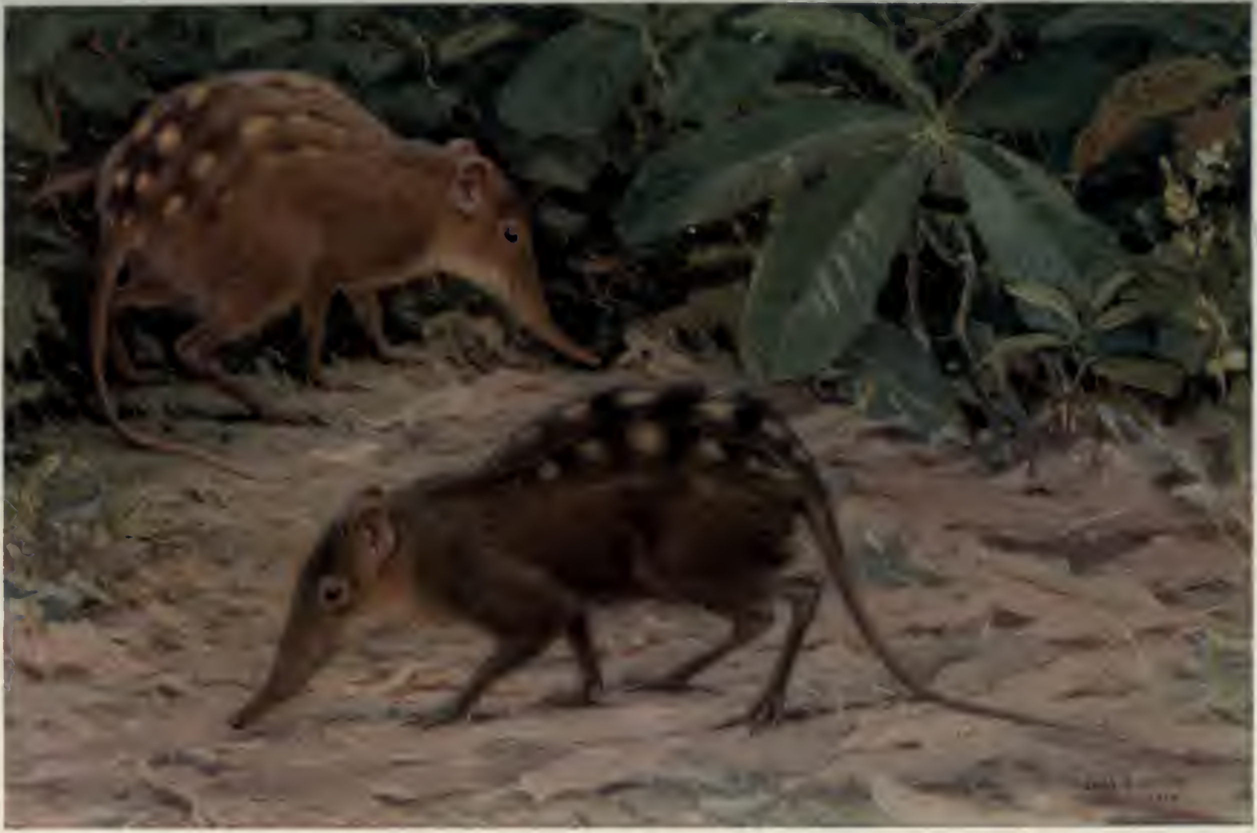
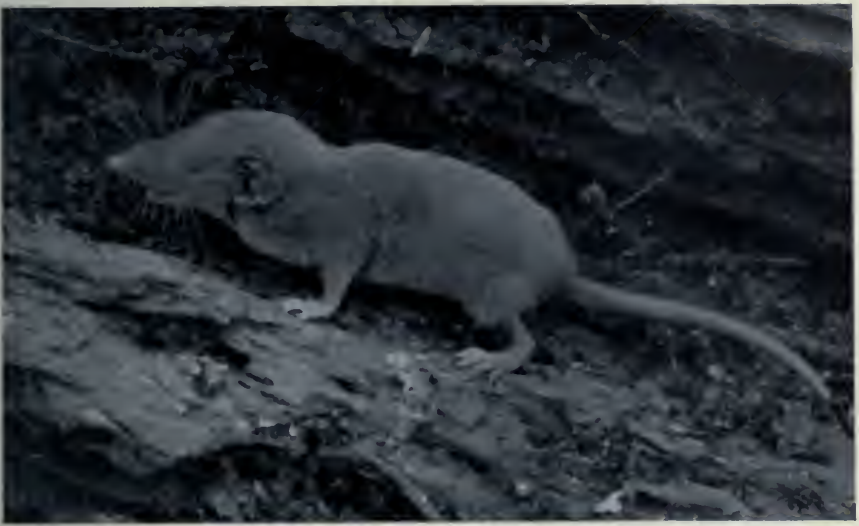


Plate II

Fig. 1. *Crocidura jacksoni denti* Dollman. Female adult, Amer. Mus. No. 48520, Medje, May 28, 1914.

Fig. 2. *Sylvisorex oriundus* Hollister. Type. Female adult, Amer. Mus. No. 48554, Medje, May 20, 1914. Photographs from specimens in the flesh. Both natural size.



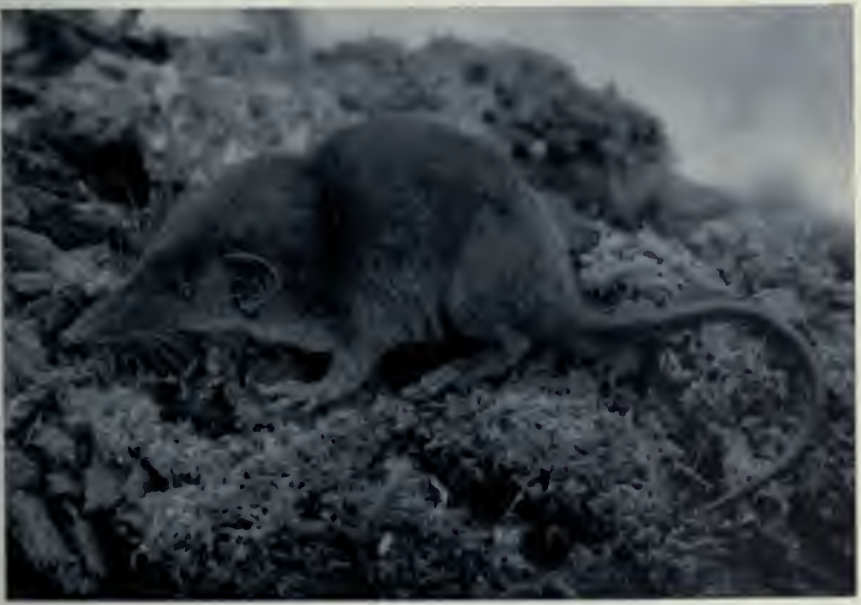


PLATE III

Scutisorex congicus Thomas. Male adult, Amer. Mus. No. 48475, Medje, May 30, 1914. Photograph from specimen in the flesh. Natural size.

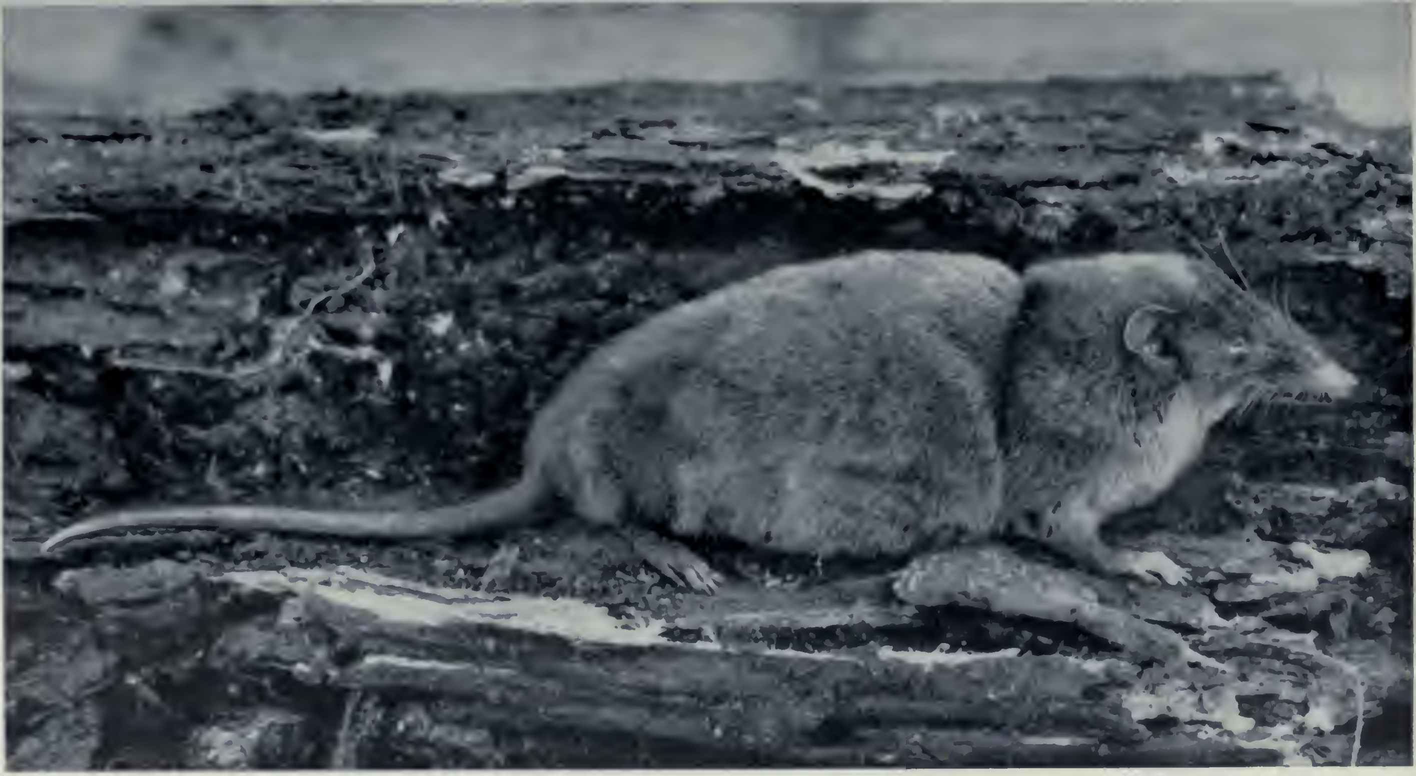
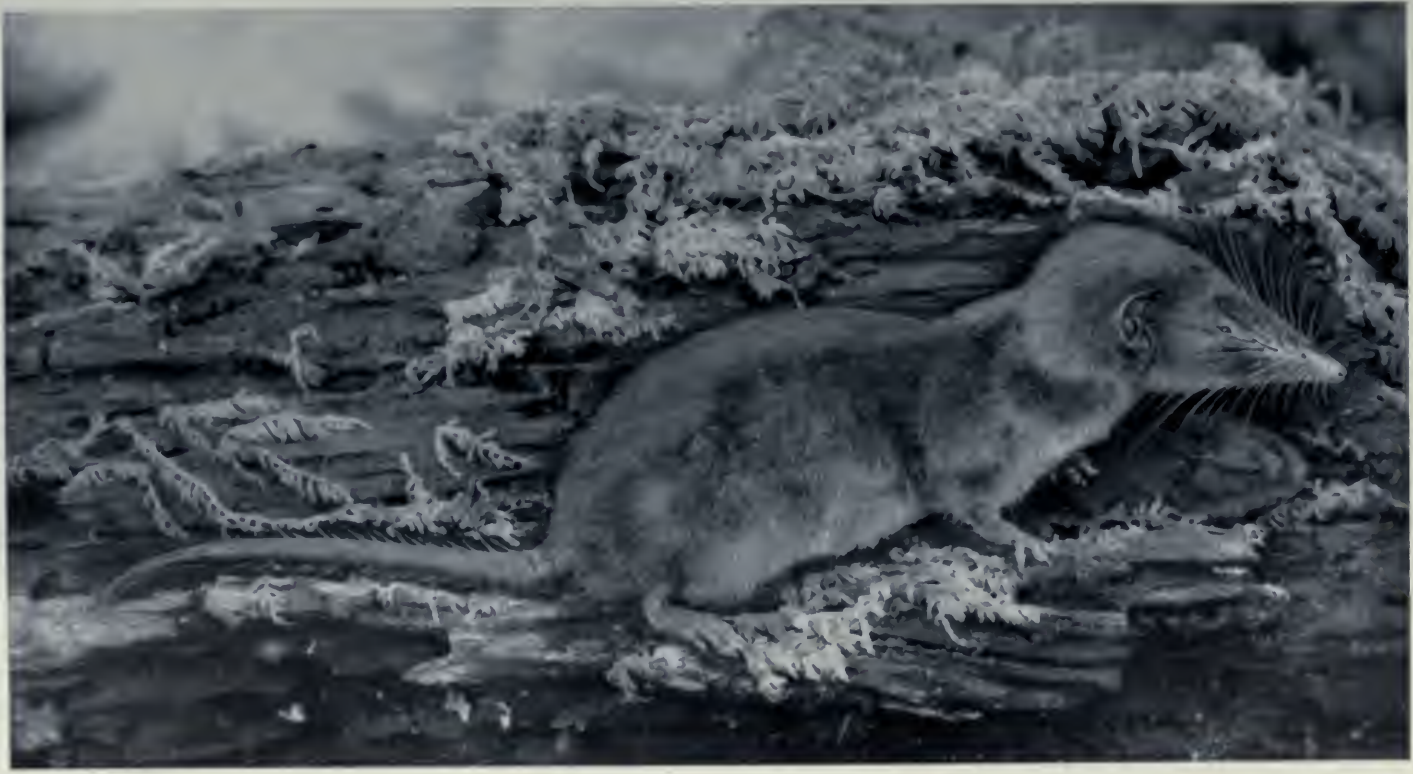


PLATE IV

Crocidura nyansæ kivu Osgood. Male adult, Amer. Mus. No. 48501, Medje, June 13, 1914. Photograph from specimen in the flesh. Natural size.



59.9,32(67.5)

Article II.—SCIURIDÆ, ANOMALURIDÆ, AND IDIURIDÆ COLLECTED BY THE AMERICAN MUSEUM CONGO EXPEDITION[1]

By the Late J. A. Allen[2]

Plate V

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INTRODUCTION

The Sciuridæ, Anomaluridæ and Idiuridæ of The American Museum of Natural History Congo Expedition, collected by Messrs. Herbert Lang and James P. Chapin during six years (1909–1915) of field work, number 480 specimens, representing 20 forms (16 species and 4 additional subspecies). The collection consists of many well-prepared skins with skulls, a number of skeletons, and a few specimens preserved in alcohol. The 315 specimens of Sciuridæ are referred to 14 forms (10 species and four additional subspecies), of which three subspecies are described as new. The 125 specimens of Anomaluridæ represent three genera and are referable to 3 forms, one of them new to science. The Idiuridæ are represented by 40 specimens of three quite different forms, two of which are here for the first time described. These far exceed the total number previously extant in all of the museums of the world, their nocturnal habits and secretive mode of life rendering their capture difficult.

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[1] Scientific Results of the Congo Expedition, Mammalogy, No. 6.

[2] After the author's demise the manuscript was arranged for publication by Herbert Lang.

This is a very valuable accession as The American Museum of Natural History had but little African material of this order previous to the reception of the Lang-Chapin Collection. Other museums of this country have generously placed at my disposal material for purposes of comparison. To Mr. Gerrit S. Miller, Jr., Curator of mammals in the United States National Museum, to Mr. Samuel Henshaw, Director, and to Dr. G. M. Allen, Curator of mammals, of the Museum of Comparative Zoölogy at Harvard University, I am indebted for the loan of many of their specimens.

The forms, and the number of specimens of each and their localities, are given in the subjoined lists.

SPECIES AND SUBSPECIES, WITH THEIR LOCALITIES AND NUMBER OF SPECIMENS FROM EACH LOCALITY

Species and Subspecies	Localities	Specimens
	Sciuridæ	
1. *Æthosciurus poensis* (A. Smith)	Medje 2, Niapu 1	3
2. *Heliosciurus rufobrachium pasha* (Schwann)	Faradje 2, Niangara 10	12
3. *Heliosciurus rufobrachium medjianus*, new subspecies	Akenge 1, Avakubi 1, Bosobangi 1, Gamangui 1, Medje 23, Niapu 9	36
4. *Heliosciurus rufobrachium rubricatus*, new subspecies	Avakubi 7, Bafwasende 1, Lubila 1	9
5. *Heliosciurus multicolor lateris* Thomas	Aba 1	1
6. *Funisciurus anerythrus anerythrus* (Thomas)	Avakubi 7, Gamangui 6, Medje 8, Ngayu 2, Niangara 5	28
7. *Funisciurus anerythrus niapu*, new subspecies	Niapu 22, Stanleyville 2	24

	Species and Subspecies	Localities	Specimens
8.	*Funisciurus pyrropus akka* de Winton	Akenge 3, Avakubi 1, Boyulu 1, Gamangui 4, Medje 7, Niangara 3, Niapu 13	32
9.	*Funisciurus congicus congicus* (Kuhl)	Leopoldville 1	1
10.	*Tamiscus emini emini* (Stuhlmann)	Avakubi 6, Bafwabaka 7, Batama 1, Faradje 2, Gamangui 1, Medje 10, Ngayu 4, Niangara 5, Niapu 12, Pawa 1, Poko 1, Stanleyville 13	63
11.	*Tamiscus alexandri* (Thomas and Wroughton)	Avakubi 4, Faradje 3, Gamangui 5, Medje 2, Nala 1, Ngayu 2, Pawa 1, Rungu 1	19
12.	*Protoxerus stangeri centricola* (Thomas)	Akenge 5, Avakubi 5, Bafwabaka 2, Faradje 1, Gamangui 4, Kamunionge 1, Medje 6, Ngayu 7, Niangara 2, Niapu 20, Stanleyville 1	54
13.	*Protoxerus stangeri signatus* Thomas	Bolobo 1	1
14.	*Euxerus erythopus lacustris* (Thomas)	Faradje 21, Niangara 10, Rungu 1	32
	Anomaluridæ		
15.	*Anomalurus jacksoni jacksoni* de Winton	Akenge 7, Avakubi 2, Gamangui 1, Medje 28, Niapu 16, Panga 4	58
16.	*Anomalurella pusilla* (Thomas)	Akenge 4, Avakubi 1, Medje 36, Ngayu 2, Niapu 10	53
17.	*Anomalurops beecrofti chapini*, new subspecies	Akenge 1, Medje 12, Poko 1	14
	Idiuridæ		
18.	*Idiurus zenkeri zenkeri* Matschie	Avakubi 1, Medje 27, Niapu 2	30
19.	*Idiurus langi*, new species	Medje 6	6
20.	*Idiurus panga*, new species	Panga 4	4

Localities, Species and Subspecies, and Number of Specimens taken at each Locality

Localities	Species and Subspecies	Specimens	Totals
Aba	*Heliosciurus multicolor lateris* Thomas	1	1
Akenge	*Heliosciurus rufobrachium medjianus*, new subsp.	1	
“	*Funisciurus pyrropus akka* de Winton	3	
“	*Protoxerus stangeri centricola* (Thomas)	5	
“	*Anomalurus jacksoni jacksoni* de Winton	7	
“	*Anomalurella pusilla* (Thomas)	4	
“	*Anomalurops beecrofti chapini*, new subsp.	1	21
Avakubi	*Heliosciurus rufobrachium medjianus*, new subsp.	1	
“	*Heliosciurus rufobrachium rubricatus*, new subsp.	7	
“	*Funisciurus anerythrus anerythrus* (Thomas)	7	
“	*Funisciurus pyrropus akka* de Winton	1	
“	*Tamiscus emini emini* (Stuhlmann)	6	
“	*Tamiscus alexandri* (Thomas and Wroughton)	4	
“	*Protoxerus stangeri centricola* (Thomas)	5	
“	*Anomalurus jacksoni jacksoni* de Winton	2	
“	*Anomalurella pusilla* (Thomas)	1	
“	*Idiurus zenkeri zenkeri* Matschie	1	35
Bafwabaka	*Tamiscus emini emini* (Stuhlmann)	7	
“	*Protoxerus stangeri centricola* (Thomas)	2	9
Bafwasende	*Heliosciurus rufobrachium rubricatus*, new subsp.	1	1
Batama	*Tamiscus emini emini* (Stuhlmann)	1	1
Bolobo	*Protoxerus stangeri signatus* Thomas	1	1
Bosobangi	*Heliosciurus rufobrachium medjianus*, new subsp.	1	1
Boyulu	*Funisciurus pyrropus akka* de Winton	1	1
Faradje	*Heliosciurus rufobrachium pasha* (Schwann)	2	
“	*Tamiscus emini emini* (Stuhlmann)	2	
“	*Tamiscus alexandri* (Thomas and Wroughton)	3	
“	*Protoxerus stangeri centricola* (Thomas)	1	
“	*Euxerus erythopus lacustris* (Thomas)	21	29
Gamangui	*Heliosciurus rufobrachium medjianus*, new subsp.	1	
“	*Funisciurus anerythrus anerythrus* (Thomas)	6	
“	*Funisciurus pyrropus akka* de Winton	4	
“	*Tamiscus emini emini* (Stuhlmann)	1	
“	*Tamiscus alexandri* (Thomas and Wroughton)	5	
“	*Protoxerus stangeri centricola* (Thomas)	4	
“	*Anomalurus jacksoni jacksoni* de Winton	1	22
Kamunionge	*Protoxerus stangeri centricola* (Thomas)	1	1
Leopoldville	*Funisciurus congicus congicus* (Kuhl)	1	1
Lubila	*Heliosciurus rufobrachium rubricatus*, new subsp.	1	1
Medje	*Æthosciurus poensis* (A. Smith)	2	
“	*Heliosciurus rufobrachium medjianus*, new subsp.	23	
“	*Funisciurus anerythrus anerythrus* (Thomas)	8	
“	*Funisciurus pyrropus akka* de Winton	7	

Localities	Species and Subspecies	Specimens	Totals
Medje	*Tamiscus emini emini* (Stuhlmann)	10	
“	*Tamiscus alexandri* (Thomas and Wroughton)	2	
“	*Protoxerus stangeri centricola* (Thomas)	6	
“	*Anomalurus jacksoni jacksoni* de Winton	28	
“	*Anomalurella pusilla* (Thomas)	36	
“	*Anomalurops beecrofti chapini*, new subsp.	12	
“	*Idiurus zenkeri zenkeri* Matschie	27	
“	*Idiurus langi*, new sp.	6	167
Nala	*Tamiscus alexandri* (Thomas and Wroughton)	1	1
Ngayu	*Funisciurus anerythrus anerythrus* (Thomas)	2	
“	*Tamiscus emini emini* (Stuhlmann)	4	
“	*Tamiscus alexandri* (Thomas and Wroughton)	2	
“	*Protoxerus stangeri centricola* (Thomas)	7	
“	*Anomalurella pusilla* (Thomas)	2	17
Niangara	*Heliosciurus rufobrachium pasha* (Schwann)	10	
“	*Funisciurus anerythrus anerythrus* (Thomas)	5	
“	*Funisciurus pyrropus akka* de Winton	3	
“	*Tamiscus emini emini* (Stuhlmann)	5	
“	*Protoxerus stangeri centricola* (Thomas)	2	
“	*Euxerus erythopus lacustris* (Thomas)	10	35
Niapu	*Æthosciurus poensis* (A. Smith)	1	
“	*Heliosciurus rufobrachium medjianus*, new subsp.	9	
“	*Funisciurus anerythrus niapu*, new subsp.	22	
“	*Funisciurus pyrropus akka* de Winton	13	
“	*Tamiscus emini emini* (Stuhlmann)	12	
“	*Protoxerus stangeri centricola* (Thomas)	20	
“	*Anomalurus jacksoni jacksoni* de Winton	16	
“	*Anomalurella pusilla* (Thomas)	10	
“	*Idiurus zenkeri zenkeri* Matschie	2	105
Panga	*Anomalurus jacksoni jacksoni* de Winton	4	
“	*Idiurus panga*, new sp.	4	8
Pawa	*Tamiscus emini emini* (Stuhlmann)	1	
“	*Tamiscus alexandri* (Thomas and Wroughton)	1	2
Poko	*Tamiscus emini emini* (Stuhlmann)	1	
“	*Anomalurops beecrofti chapini*, new subsp.	1	2
Rungu	*Tamiscus alexandri* (Thomas and Wroughton)	1	
“	*Euxerus erythopus lacustris* (Thomas)	1	2
Stanleyville	*Funisciurus anerythrus niapu*, new subsp	2	
“	*Tamiscus emini emini* (Stuhlmann)	13	
“	*Protoxerus stangeri centricola* (Thomas)	1	16

NEW SPECIES AND SUBSPECIES, WITH THEIR TYPE LOCALITIES

1. *Heliosciurus rufobrachium medjianus.* Medje
2. *Heliosciurus rufobrachium rubricatus.* Lubila
3. *Funisciurus anerythrus niapu.* Niapu
4. *Anomalurops beecrofti chapini.* Medje
5. *Idiurus langi.* Medje
6. *Idiurus panga.* Panga

GENERAL SUMMARY

Families	Genera	Species and Subspecies	Specimens	Localities[1]
Sciuridæ	6	14	315	23
Anomaluridæ	3	3	125	8
Idiuridæ	1	3	40	4
	10	20	480	

SCIURIDÆ

ÆTHOSCIURUS Thomas

Æthosciurus THOMAS, 1916, Ann. Mag. Nat. Hist., (8) XVII, March, p. 271. Genotype, by original designation, *Sciurus poensis* A. Smith.

Æthosciurus (subgenus of *Heliosciurus*) HOLLISTER, 1919, U. S. Nat. Mus. Bull. 99, part 2, May 16, p. 9.

Æthosciurus poensis (A. Smith)

Sciurus poensis A. SMITH, 1835, South African Quart. Journ., II, p. 64. Fernando Po (Gray).

Æthosciurus poensis THOMAS, 1916, Ann. Mag. Nat. Hist., (8) XVII, p. 271.

Three specimens: Medje, 2 (♂ and ♀ adult), January 24, 1909; Niapu, 1 (♂ adult), November 28, 1913.

Collectors' measurements of the Medje specimens: Total length, ♂ 322 mm., ♀ 337; head and body, ♂ 144, ♀ 152; tail vertebræ, ♂ 178, ♀ 185; hind foot, ♂ 35, ♀ 35; ear, ♂ 14, ♀ 14..

Skull, same specimens: Greatest length, ♂ 37.3, ♀ 38.2; zygomatic breadth, not measurable.

The Niapu specimen is a little smaller and less mature.

Entire pelage, including feet and tail, olivaceous gray, except ventral surface, which is washed with ochraceous medially, the color of the sides extending over the lateral third of the ventral area from axillæ to loins.

Compared with two specimens of *Æthosciurus poensis* (No. 8639, Kribi, Cameroon, and No. 15667, Mus. Comp. Zoöl., Lolodorf, Cameroon), with which they closely agree. Larger series from the two regions (Cameroon coast and Upper Congo) might indicate an appreciable average difference not indicated by the material now available.

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[1] The total number of localities at which these forms were collected is 24.

Heliosciurus Trouessart

Heliosciurus (subgenus of *Sciurus*) Trouessart, 1880, Le Naturaliste, II, October, p. 292. Genotype, by subsequent designation (Thomas, 1909), *Sciurus gambianus* Ogilby. Trouessart originally designated *Sciurus annulatus* Desmarest as the type, but as this species is not positively identifiable Thomas has, with good reason, replaced it by *Sciurus gambianus* Ogilby.

The *Heliosciurus rufobrachium*[1] group is represented in the Lang-Chapin Collection by 57 specimens, collected in the region comprised between Avakubi and Bafwasende, south of the Ituri-Aruwimi River, northward to Niangara, on the Uele River, and eastward to Faradje. Three geographical areas are thus included—(1) the region south of the Ituri-Aruwimi covered with Rain Forest, (2) the forested area between the Ituri-Aruwimi and Bomokandi-Uele rivers, and (3) the Uele bushveldt district to the north. The specimens from these districts, when arranged serially, show well-marked differences in coloration in correlation with the varying conditions of the districts, the extremes represented—the Avakubi specimens on the one hand and the Niangara-Faradje specimens on the other—being so widely different that, without the connecting series from intermediate points, they might readily be considered as possibly specifically separable, especially if represented by a single specimen or even by a small series of specimens. The specimens from the intermediate localities show, however, unmistakable intergradation between the two extreme geographic phases. The differences are primarily the amount and intensity of rufous on both fore and hind limbs and the color of the whole ventral area, particularly of the throat and inside of the limbs. Also the northern pale veldt form is distinctly smaller than either of the two forest forms. The main feature of differentiation is the steadily increasing erythrism of the ventral surface and limbs from the northern veldt country to the heavy Rain Forest south of the Ituri.

In the coloration of the upper surface there is little to distinguish the specimens from the three areas, although the Niangara and Faradje specimens average somewhat paler than those from farther south.

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[1] Mr. Lang has called my attention to the fact that *Sciurus rufobrachium* Waterhouse has nearly three months priority over *S. rufobrachiatus* of the same author and it should therefore be accepted in place of the latter. The species so long universally known as *Sciurus rufobrachiatus* was named *Sciurus rufobrachium* by Waterhouse in an incidental reference to it in a footnote to a paper in the 'Annals and Magazine of Natural History' (X, p. 202) published in November 1842, but in his formal description of the species (Proc. Zoöl. Soc. London for 1842, p. 128, published January 1843) he changed the name to *Sciurus rufobrachiatus*, without explanation or reference to the earlier name for the same species. Consequently the name *Sciurus rufobrachium* was used by just a few, Fitzinger (1867) being the last. All succeeding authors have either overlooked or ignored the earlier name till it was brought to light by Mr. Lang in the preparation of his paper on the bibliography and distribution of African members of this group.

It may be noted also that Waterhouse's *Sciurus leucogenys* has priority over his *Sciurus erythrogenys*, the two cases being parallel and dating from the same footnote.

Through individual variation in the general tone, specimens from either of the series can be selected which are mutually indistinguishable in the color of the upperparts. It is quite different, however, with the ventral surface. In the northern form (*H. r. pasha*) it is pale yellowish white, varying in different specimens from dull whitish to faintly yellowish on the median area from the throat to the anal region, with usually a large whiter pectoral area, the sides being darkened by the dark basal portion of the hairs showing through the superficial light tipping. The chin and throat are a little browner than the foreneck and breast, being sometimes dull yellowish brown, but rarely approaching rufous. The median portion of the extreme base of the under side of the tail has sometimes a slight rufous tone. The outer edge of the forearm and the upper surface of the manus vary from dark rufous to brownish rufous, but the inside of the forearm is pale like the ventral surface, usually without trace of rufous.

In specimens of the other extreme, taken south of the Ituri near Avakubi, the whole lower surface of the body has a strong rufous tone, the throat, foreneck, sides of breast, inguinal region, and entire inner surface of both fore and hind limbs are intense vivid rufous, as is also a conspicuous median patch at the base of the under side of the tail, and the upper surface of the fore and hind feet are also red. The median ventral area, from the chest to the lower abdomen, is pale rufous grizzled slightly with black.

The three forms may be characterized as follows.

1. Light northern form: Underparts superficially pale, the hair-tips whitish or pale yellowish, usually a rather distinct narrow median light band (often broadening at pectoral region) contrasting with a much darker and broader area on either side from axillæ to loins; throat and inside of limbs light, uniform in color with the central light portion of ventral surface, except wrists; outside of hind limbs like back; outer edge of forearm and upper surface of feet pale rufous. On hind limbs the brownish-rufous tone is usually restricted to upper surface of feet; in exceptionally erythric specimens it may extend to the lower leg and include the inner surface as well as the outer, thus forming a dull rufous band just above the ankle, and even extend up the inner side of the leg, with a similar extension of rufous on the inner surface of the lower forearm.. *H. r. pasha* (Schwann).
2. Darker middle form: Underparts darker, nearly uniform except for a small sharply defined white pectoral area, the hairs ringed basally with black and buff-tipped; throat and inside of limbs pale or dull rufous, in contrast with abdominal region; outer surface of hind limbs like back; outer edge of fore limbs intense rufous, which encircles the lower forearms and lower legs and includes the upper surface of fore and hind feet.
H. r. medjianus, new subspecies.

3. Darker southern form: Underparts medially strongly suffused with pale rufous, usually without trace of a whitish pectoral area; throat, sides of head below eyes, entire inner side of fore and hind limbs, and extreme posterior part of abdomen intense dark rufous; outer edge of fore limb, lower forearm in front and upper surface of fore and hind feet, wrists and ankles chestnut-rufous, which also extends to the median basal underside of tail.
H. r. rubricatus, new subspecies.

Average External and Cranial Measurements of *Heliosciurus rufobrachium pasha*, *medjianus*, and *rubricatus*

		External					Cranial	
	Number of Specimens	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Greatest Length	Zygomatic Breadth
H. r. pasha, Niangara	10	473	223	251	56.2	18.3	52.2	30.6
H. r. medji- Medje and	12	497	239	258	58.2	18.0	52.9	30.5
anus, Niapu	6	507	239	268	58.3	17.5	53.4	30.8
H. r. rubricatus, Avakubi	6	501	234	262	59.3	18.3	53.4	31.9

The relation of these three forms is so obviously geographic, and reflects so strikingly the effect of environment, it seems desirable to recognize these facts nomenclaturally, as follows.

Heliosciurus rufobrachium pasha (Schwann)

Sciurus rufobrachiatus pasha Schwann, 1904, Ann. Mag. Nat. Hist., (7) XIII, January, p. 72. Type locality, Bellima, Mombuttu, Belgian Congo.

Heliosciurus rufobrachiatus pasha Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473, (part). The Irumu specimen.

Represented by 12 specimens (7 males, 5 females), all adult, collected as follows:

Niangara, 10 (6 ♂, 4 ♀), November 9–20, 1910.

Faradje, 2 (♂, ♀), December 2, 1911.

The type locality of *Sciurus rufobrachium pasha* Schwann is given as "Bellima, Mombuttu," the type being an adult male collected by Emin Pasha, July 13, 1883. Bellima does not now exist, Mr. Lang informs me. It was long since abandoned by the natives. But its former site was about 25 miles southeast of the present Niangara. Hence the ten specimens in the Lang-Chapin Collection are practically topotypes, from which the two from Faradje are indistinguishable.

Collectors' measurements of the Niangara series (6 males, 4 females):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	478 (470–488)	223 (216–235)	250 (245–260)	57.3 (54–59)	18.7 (17–19)
♀	467 (455–479)	217 (215–227)	250 (242–257)	55.0 (53–56)	18.5 (17–20)

Skulls, same specimens:

	Greatest Length (=occipito-nasal length)	Zygomatic Breadth (=greatest breadth)
♂	52.4 (51.0–54.0)	30.3 (29.1–31.3)
♀	51.7 (49.2–55.7)	30.8 (28.8–32.0)

This form is readily distinguishable from those recorded below from localities more to the southward, including Medje, Niapu, and Avakubi, by its much paler general coloration and very much lighter underparts.

Heliosciurus rufobrachium medjianus, new subspecies

Heliosciurus rufobrachiatus pasha Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473, (part). The Medje and "Poko" specimens. "Poko" = south of Poko, in forest probably nearer Niapu than Poko.

Type, No. 50761, ♀ adult, Medje, Belgian Congo, January 17, 1910; Herbert Lang and James P. Chapin. Orig. No. 487.

Larger and darker than *H. r. pasha*, the underparts very much darker, the white tips of tail hairs much shorter, inside of limbs with much more rufous. Differs from *H. r. rubricatus* in lacking the strong rufous suffusion of the underparts and the intense rufous of inside of limbs, throat and anal region.

Collectors' measurements of type: Total length, 502 mm.; head and body, 224; tail vertebræ, 278; hind foot, 59; ear, 20.

Skull (type): Greatest length (=occipito-nasal length), 53.6; condyloincisive length, 49.3; least interorbital breadth, 15.8; tip to tip of postorbital processes, 23.7; postorbital breadth, 16.1; breadth of braincase, 22.2; zygomatic breadth, 30.7; length of nasals, 16.1; breadth of nasals anteriorly, 8.4, do. at posterior border, 5; length of maxillary toothrow, 10.

Represented by 36 specimens (of which 23 are topotypes), taken as follows:

Avakubi, north side of Ituri River toward Bosobangi, 1 (♂ adult), April 11, 1914.

Bosobangi, 1 (♀ adult), December 24, 1909.

Gamangui, 1 (♂ adult), February 7, 1910.

Medje, 23 (13 adult, 10 immature): 9 (6♂, 3♀, all adult), January 15–20, 1910; 10 (5♂, 5♀, all immature, ranging in age from nurslings to half-grown), April 10, August 3–September 14, 1910; 4 (2♂, 2♀, adults—1 ♂ complete skeleton), March 22, 1910; February 28, April 2, 6, 1914.

Niapu, 9 (7♂, 2♀, of which 6 are adult and 3 immature), November 14–December 8, 1913.

Akenge, 1 (♀ adult), October 16, 1913.

Collectors' measurements of 13 adults (8 ♂, 5 ♀) from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	497 (441–534)	241 (225–254)	256 (211–292)	58.4 (55–62)	18.5 (17–20)
♀	495 (475–502)	231 (224–238)	264 (246–278)	57.5 (56–59)	18.2 (17–20)

Skulls, same specimens:

	Greatest Length	Zygomatic Breadth
♂	53.0 (50.7–54.9)	30.7 (28.9–31.9)
♀	52.5 (51.4–53.6)	30.5 (29.4–31.6)

Collectors' measurements of 6 adult specimens (4 ♂, 2 ♀) from Niapu:

Total length, 507 (487–524); head and body, 239 (229–247); tail vertebræ 268 (255–280); hind foot, 58.3 (53–61); ear, 17.5 (17–18).

Skull (5 of the same specimens, 4 ♂, 1 ♀): Greatest length, 53.4 (52.4–54.2); zygomatic breadth, 31.0 (29.8–31.6).

Collectors' measurements of 4 specimens (2 ♂, 2 ♀) from other localities near Niapu (Bosobangi 2, Gamangui 1, Akenge 1):

Total length, 493 (452–542); head and body, 237 (225–251); tail vertebræ, 265 (248–291); hind foot, 54.5 (53–56); ear, 18 (16–19).

Skull (same specimens): Greatest length, 52.8 (51.9–53.9); zygomatic breadth, 30.3 (29.7–31.8).

The specimens from Niapu and other localities near Niapu agree closely in coloration and other features with the type series from Medje. The large series from Medje is especially interesting from the fact that it contains a large number of young specimens, ranging in age from nurslings to nearly half grown. Of six nurslings (the only teeth present are the incisors) one was taken April 10, and five August 3, 5, and 24, three of them being from the same litter. Four others are a week or two older (taken September 2, 9, 13, 14) with the first cheek-teeth just breaking through the gums. The coloration of these young specimens differs from that of adults of the same series in no material respect in either pattern or color. The pelage is, of course, much softer with more underfur, and the ventral surface is more heavily clothed, and hence the color areas are more sharply outlined. The hair of the dorsal surface differs from that of adults in the annulations being apparently narrower, an effect due probably to the shorter pelage. The hairs on the sides of the body are minutely tipped with whitish passing gradually into buffy or pale fulvous toward the midline of the back, as is the case with adults, so that the surface effect is exactly as in the latter. On the ventral surface the color areas are more sharply defined than in adults, owing to the thinner and less complete condition of the coat in the latter. All have the pectoral white patch indicated, and in nearly all it is pure white and forms a conspicuous mark, although varying greatly in size in different individuals. Those in which it is largest have also a small tuft of pure white soft hairs at the axillæ, which is obsolete in those that have the pectoral mark only slightly developed. The sides of the nose, chin, and upper throat are dull yellowish brown, becoming paler posteriorly. The inside of the fore and hind limbs is pale yellowish rufous, which deepens on the lower hind limbs and anal region to a much darker tone, and is more or less strongly diffused over the basal portion of the underside of the tail. The mid-abdominal region (axillæ to loins) is a grizzle of dull brown and pale buffy, with a tendency to a lighter median line. The upper surface of the fore and hind feet is mixed dark rufous and black, the black basal portion of the hairs showing more or less at the surface.

Individual color variation in adults is due primarily to the amount of rufous suffusion present, varying from a strong rufous tone throughout the pelage to its almost entire absence. Specimens of either of these types, however, are exceptional. The specimen selected as type of *medjianus* represents the average condition. The extreme rufous examples strongly approach *rubricatus* and indicate intergradation between the two forms. The specimens recorded by Thomas from Medje and Poko as referable to *H. r. pasha* (*loc. cit.*) should doubtless be referred to *medjianus*, since these localities are in the type region of the latter.

Heliosciurus rufobrachium rubricatus, new subspecies

Type, No. 50748, ♂ adult, near the Lubila River, an affluent of the Tshopo River, about 50 miles southwest of Avakubi (south of the Ituri River), Belgian Congo, September 20, 1909; Herbert Lang and James P. Chapin, Orig. No. 123.

Similar to *H. r. medjianus* in size and color of upperparts; underparts more strongly suffused with rufous; inside of fore and hind limbs and anal region intense dark rufous; upper surface of feet, wrists and ankles, and median basal underside of tail chestnut-rufous.

Collectors' measurements of type: Total length, 552 mm.; head and body, 255; tail vertebræ, 297; hind foot, 61; ear, 19.

Skull (type): Greatest length (=occipito-nasal), 55.4; condyloincisive length, 51.2; least interorbital breadth, 16.7; tip to tip of postorbital processes, 25.6; postorbital breadth, 14.4; breadth of brain-case, 23.1; zygomatic breadth, 31.5; length of nasals, 17.6; breadth of nasals anteriorly, 8.3, do. at posterior border, 6.6; length of maxillary toothrow, 10.9.

Represented by 9 specimens, as follows:

Avakubi, 7 (3 ♂, 3 ♀, all adult, 1 in alcohol), October 1, 13, December 8, 1909, January 12, 24, June 22, and August 26, 1914.

Bafwasende (35 miles south of Avakubi), 1 (♂ adult), September 23, 1909.

Lubila, 1 (♂ adult), September 20, 1909.

Collectors' measurements of 6 specimens (3 ♂, 3 ♀) from Avakubi: Total length, 501 (482–525); head and body, 234 (226–253); tail vertebræ, 262 (251–279); hind foot, 59.3 (54–63); ear, 18.3 (17–20).

Skull (4 of same specimens—2 too much broken for measurement): Greatest length, 53.4 (52.4–54.8); zygomatic breadth, 31.9 (29.7–33.4).

The relation of the present form to *medjianus* has been indicated in the detailed comparison already given (pp. 45 to 47) of the three forms of the *rufobrachium* group represented in the present collection. The differences that distinguish *medjianus* from *pasha* are greatly intensified in *rubricatus*, the northward range of which appears to be limited by the Ituri River.

Heliosciurus multicolor Group

Heliosciurus multicolor lateris Thomas

Heliosciurus multicolor lateris THOMAS, 1909, Ann. Mag. Nat. Hist., (8) IV, August, p. 102. Type locality, Lado, Mongalla.

Represented by one specimen, subadult female, Aba, Belgian Congo, December 12, 1911.

Collectors' measurements: Total length, 390 mm.; head and body, 185; tail vertebræ, 205; hind foot, 45 (s. u. 42.5); ear, 15.

Skull: Greatest length, 45.4; condyloincisive length, 40.7; zygomatic breadth, 36.

Provisionally referred to this subspecies, with the description of which it well agrees.

FUNISCIURUS Trouessart

Funisciurus (subgenus of *Sciurus*) TROUESSART, 1880, Le Naturaliste, II, No. 37, October 1, p. 293. Genotype, by monotypy, *Sciurus isabella* Gray = *Funisciurus lemniscatus isabella* (Gray). A few weeks later (idem, 1880, II, No. 40, November 15, p. 315) he designated *Sciurus lemniscatus* LeConte as type of *Funisciurus*, on the assumption that *S. isabella* Gray was a strict synonym of the earlier *S. lemniscatus*.

Funisciurus anerythrus anerythrus (Thomas)

Sciurus pyrrhopus anerythrus THOMAS, 1890, Proc. Zoöl. Soc. London, pp. 447, 448, Pl. XL, animal. Two specimens. Type locality, Buguera.

Funisciurus anerythrus THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473. Mawambi (1), Avakubi (1), Medje (6), Poko (15 specimens).

Represented by 28 specimens, taken at five localities, as follows:

Avakubi, 7 (2 ♂, 1 adult, 1 immature; 5 ♀, all adult), October 7, November 5, 24, 1909, February 11, April 8, 1914.

Ngayu, 2 (2 ♀—1 adult, 1 immature), December 17, 1909.

Gamangui, 6 (1 ♂, 5 ♀—2 ♀ immature), January 30, February 7, 15, 19, 1910.

Medje, 8 (3 ♂, 5 ♀—2 ♂, 2 ♀ immature), January 18–24, September 26, October 5, 1910, April 3, May 25, June 15, 1914.

Niangara, 5 (1 ♂ adult, 4 ♀—2 immature), November 7, 15, 20, 1910.

Collectors' measurements of 14 adult specimens (4 males, 10 females, all middle-aged to adult) from Ngayu, 1 (♀); Avakubi, 4 (1 ♂, 3 ♀); Gamangui, 4 (1 ♂, 3 ♀); Medje, 2 (1 ♂, 1 ♀); Niangara, 3 (1 ♂, 2 ♀).

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	355 (346–368)	186 (183–193)	165 (163–175)	46.5 (46–48)	18.0 (17–19)
♀	356 (348–365)	189 (181–195)	168 (160–183)	47.1 (45–49)	17.4 (16–19)

The above measurements indicate a slightly greater size for the females, as is the case also in *F. pyrropus akka* from about the same localities.

The underparts vary considerably in the amount of buffy or ochraceous wash on the ventral surface, independently of season or locality, the palest being nearly white and a few (four out of twenty-eight) closely approaching the average of the Niapu series of twenty-two described below.

Funisciurus anerythrus niapu, new subspecies

Type, No. 50877, ♂ adult, Niapu, Belgian Congo, November 9, 1913; Herbert Lang and James P. Chapin, Orig. No. 2120.

Similar to typical *anerythrus*, but underparts averaging much darker and more ochraceous, the ochraceous tips of the hairs being longer and brownish ochraceous, often wholly concealing the dark basal portion of the pelage.

Collectors' measurements of the type: Total length, 359 mm.; head and body, 190; tail vertebræ, 169; hind foot, 47; ear, 18.

Skull (type): Greatest length (=occipito-nasal), 45.7; condyloincisive length, 40.7; least interorbital breadth, 11.7; tip to tip of postorbital processes, 19.2; postorbital breadth, 16.1; breadth of brain-case, 20.1; zygomatic breadth, 25.5; length of nasals, 12.2; breadth of nasals anteriorly, 4.6, do. posteriorly, 5.9; length of maxillary toothrow, 8.1.

Represented by 24 specimens collected as follows:

Niapu, 22 (10 ♂, 12 ♀—3 ♂ and 4 ♀ immature) all collected November 9–30, 1913, except one taken at same locality a month later (December 25).

Stanleyville, 2 (♂, ♀ in alcohol), September 6, 1909, January 18, 1915.

Collectors' measurements of 13 adult specimens from Niapu (6 males, all adult; 7 females, of which 3 are young adults):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	356 (337–390)	195 (181–226)	162 (155–169)	45.7 (45–47)	17.3 (17–19)
♀	350 (340–364)	199 (178–205)	163 (157–165)	46.0 (45–47)	17.3 (16–18)

Skulls, same specimens:

	Greatest Length	Zygomatic Breadth
♂	46.5 (43.6–49.0)	25.7 (24.7–26.7)
♀	46.9 (44.9–49.7)	25.2 (24.4–26.3)

It is clearly evident that the marked difference in the coloration of the underparts, which alone distinguishes strongly the Niapu specimens from all of those from the other six localities to the eastward, is not seasonal rather than geographic, the fact being that the greater part of the adults from the other localities were taken at the same season (most of them during the same month) as those from Niapu. A series of five from

Niangara were all taken in November; five others from Avakubi were taken October 7 to November 24; five from Medje were also taken near the same season (September 26, October 5, and January 18–24). When laid out in two series, the specimens from Niapu in one and those from the other localities in the other, it is seen that only a few of the most heavily colored specimens from the eastern localities equal the palest of the Niapu series in either the extent or intensity of the ochraceous wash of the ventral surface. While a few of the lighter colored specimens in the Niapu series can be matched by a few of the darkest specimens in the other, and thus indicate intergradation, the average difference is striking, particularly when the palest specimens of the two series are compared. It seems desirable therefore to recognize the Niapu series in nomenclature as a saturate type of the group, especially since a pale form of *anerythrus* (*F. a. bandarum* Thomas) has been designated from the upper Shari River.

In the present connection it may be of interest to give the results of a comparison, especially in respect to size, of the *F. pyrropus akka* series of thirty-two specimens with the fifty-two of the *F. anerythrus* group, since both were collected at the same time at about the same localities. First it may be stated that the two forms of *anerythrus* show no difference in size, and the same is true also of the *akka* and *anerythrus* series, in either external or cranial measurements. Nor am I able to distinguish the skull of *akka* by any feature from the skull of *anerythrus*. In the coloration of the upperparts there is also a close resemblance, the chief distinction being the color of the lateral line, which is pale buffy in *akka* and white in *anerythrus*, often indistinct in both. The tail is also alike in both, on both surfaces. But the difference in the color of the outside of the limbs (including the upper surface of the feet) and the ventral surface is striking. In *anerythrus* the legs and feet externally and the sides and front of the head are brown with a dull cinnamon-rufous suffusion; in *akka* intense brownish rufous, particularly on the hind limbs and feet. In *anerythrus* the whole ventral surface and inside of limbs is heavily washed with ochraceous (ochre-yellow to ochraceous rufous), the basal third of the hairs pale plumbeous; in *akka* everywhere clear white to the base of the hairs.[1] As both *anerythrus* and *akka* live together abundantly at all localities from which either is represented in the present collection, with not a single intermediate in a joint series of eighty-four specimens, it is evident that their status is that of distinct species. Yet in measurements and proportions and in the coloration of the upperparts (front and sides of head and lateral line excluded) the two forms are practically indistinguishable. In respect to measurements, two series of adults, comprising 13 specimens of *niapu* and 14 of *akka*, afford the following data:

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[1] The Niangara series, as might be expected, is the palest of all, but the Avakubi specimens merge with them; the palest specimen is an old male from Avakubi, taken October 7, which is white below with a slight buffy wash over the thoracic region.

External Measurements

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
F. anerythrus niapu	345	184	161	45.9	17.4
F. pyrropus akka	345	186	159	46.7	17.5

Skull Measurements

	Greatest Length	Zygomatic Breadth
F. anerythrus niapu	47.4	25.2
F. pyrropus akka	46.8	24.2

The measurements and proportions are thus practically identical in the two forms, the averages in external measurements (taken from specimens in the flesh by the collectors) varying from 0 to 2 mm., and those of the skulls from 0.6 to 1 mm.

Funisciurus pyrropus akka de Winton

Sciurus pyrrhopus Thomas, 1888, Proc. Zoöl. Soc. London, p. 9. Two specimens. Type locality, Tingasi, Monbuttu, Belgian Congo.

Sciurus emini de Winton, 1895, Ann. Mag. Nat. Hist., (6) XVI, August, p. 197. Not *Sciurus emini* Stuhlmann, 1894.

Funisciurus akka de Winton, 1899, Ann. Mag. Nat. Hist., (7) IV, December, p. 357. To replace *Sciurus emini* de Winton, preoccupied.

Funisciurus akka Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473. Medje (4), Poko (7 specimens).

Represented by 32 specimens, taken at 7 localities, as follows:

Boyulu, 1 (♂ adult), September 22, 1909.

Avakubi, 1 (♂ adult), July 16, 1914.

Gamangui, 4 (3 ♂ adult, 1 ♀ immature), January 28, February 7, 18, 1910.

Medje, 7 (2 ♂, 5 ♀—4 immature), January 23, March 25, April 1, 4, September 4, 29, 1910, June 24, 1914.

Niapu, 13 (5 ♂, 8 ♀, all adult), November 12–30, December 27, 1913.

Akenge, 3 (1 ♂, 2 ♀), September 29, October 10, 11, 1913.

Niangara, 3 (1 ♂, 2 ♀, all adult), November 9, 10, 1910.

Collectors' measurements of 13 youngish adults from Niapu (5 males, 8 females):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	337 (317–355)	186 (176–201)	151 (141–159)	47.6 (47–48)	18.2 (18–19)
♀	349 (322–371)	189 (165–206)	160 (145–173)	47.6 (45–49)	17.5 (16–18)

Skulls, same specimens:

	Greatest Length	Zygomatic Breadth
♂	46.2 (45.4–48.1)	25.5 (24.7–26.2)
♀	45.7 (45.2–47.9)	25.4 (25.0–26.8)

Only three of the thirteen Niapu specimens of which measurements are given above are old adults (1 ♂, 2 ♀), as indicated by the condition of the teeth and sexual organs (scrotum present in the male, mammæ conspicuous in the females); in the other ten the dentition is complete but the teeth are unworn or only slightly worn, and no mammæ are distinguishable in the females. The measurements below of thirteen specimens from other localities (all that are available) include only adults of middle age or older, and thus average, as would be expected, larger than the Niapu series, which consists almost entirely of rather young adults.

Collectors' measurements of 13 specimens (6 males, 7 females, all middle aged or old) from other localities (Akenge, Avakubi, Boyulu, Ngayu, 1 each; Niangara, 2; Gamangui, 3; Medje, 4):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	335 (322–351)	190 (184–208)	148 (136–156)	48.5 (48–49)	18.7 (18–20)
♀	344 (317–340)	193 (187–202)	151 (130–161)	47.0 (46–48)	18.4 (18–20)

Skulls, same specimens:

	Greatest Length	Zygomatic Breadth
♂	47.5 (46.4–48.5)	25.7 (24.9–27.1)
♀	47.9 (46.4–48.5)	26.3 (24.9–26.7)

The above measurements of two series of specimens, totaling 11 males and 15 females, indicate that the females are slightly larger than the males, but the difference is too small to be diagnostic.

The thirty-two specimens of *F. p. akka* are exceedingly constant in coloration, season and age making very little difference in this respect. The underparts, including the inside of both fore and hind limbs, are pure white to the base of the fur. Immature and September-November adult specimens show a tendency to a faint pinkish wash on the inside of the hind limbs and (exceptionally—in two or three specimens only) on the middle of the belly. The pale buff lateral line running from the shoulder to the hip varies little in color, but is much better defined in some specimens than in others, the posterior half occasionally becoming almost obsolete. The dark color of the back extends laterally to a little below the lateral line, which thus appears to be bordered along the lower side by a narrow dark band, the flanks being lighter and more suffused with yellowish than the dorsal area. The rufous of the outside of the limbs and upper surface of the feet varies considerably in tone, from light intense rufous to dull brownish rufous. The red on the sides and front of the head shares this variability of tone.

Fully adult specimens are also very constant in size, the chief variation being in the length of the tail, which may be somewhat shorter or longer than the normal length, thus contributing a variable element in the total length. The tail vertebræ are considerably shorter than the head and body, forming about 46 per cent of the total length, and about 84 per cent of the head and body length. The two pairs of mammæ are both inguinal.

Funisciurus p. akka differs from typical *pyrropus* in slightly smaller size and in the rufous of the limbs and head being less vivid and of a browner tone, but several specimens of the present series closely approach specimens of *pyrropus* from the Cameroon coast region.

Funisciurus congicus congicus (Kuhl)

Sciurus congicus Kuhl, 1820, Beitr. Zoöl., part 2, p. 66. Congo.

Represented by one specimen, adult male, Leopoldville, July 6, 1909.

Collectors' measurements: Total length, 320 mm.; head and body, 253; tail vertebræ, 167; hind foot, 39.

Skull: Greatest length, 39.1; zygomatic breadth, 26.

This specimen is referable to the *F. congicus* group, but whether it represents the typical form is not now determinable. It is evidently not *F. congicus interior* Thomas, from Inkongo.

TAMISCUS Thomas

Tamiscus Thomas, 1918, Ann. Mag. Nat. Hist., (9) I, p. 33. Genotype, by original designation, *Sciurus emini* Stuhlmann.

Tamiscus (subgenus of *Paraxerus*) Hollister, 1919, U. S. Nat. Mus. Bull. 99, part 2, May 16, p. 14.

Tamiscus emini emini (Stuhlmann)

Sciurus emini Stuhlmann (*ex* Matschie Ms.), 1894, 'Mit Emin Pasha,' I, part 1, p. 320 (footnote), p. 321, fig. animal. Neumann, 1902, Sitzungsb. Ges. naturf. Fr. Berlin, p. 180; "Länder zwischen Albert Edward und Albert Nyansa und nordwestlich des Albert Nyansa bis Monbuttu."

Paraxerus boehmi emini Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473. Medje (4), Mawambi (4), Poko (9 specimens).

Tamiscus emini emini Thomas, 1918, Ann. Mag. Nat. Hist., (9) I, January, p. 34.

Represented by 57 specimens (32 ♂, 25 ♀, of which 8 are immature, including 3 nurslings), from eleven localities, extending from Stanleyville to Faradje, as follows:

Stanleyville, 10 (6 ♂, 4 ♀, three of them immature), collected August 11–28, 1909.

Batama, near Stanleyville, 1 (♂ adult), September 16, 1909.

Avakubi, 6 (3 ♂, 3 ♀, all adult), October 8, 12, 13, 22, November 9, 1909, and January 22, 1914.

Ngayu, 3 (1 ♂, 2 ♀, all adult), December 16–24, 1909.

Bafwabaka, 7 (4 ♂, 3 ♀, all adult), December 28–31, 1909, and January 5, 7, 1910.

Medje, 10 (6 ♂, 4 ♀, of which 4 are immature, including 2 nurslings), January 15–20, 1910 (7, all adult but one), March 24, 1914 (a nursling), and September 4, 9, 1914 (both immature, 1 a nursling).

Gamangui, 1 (♀ adult), February 4, 1910.

Pawa, 1 (♂ adult), October 20, 1910.

Niangara, 5 (3 ♂, 2 ♀, all adult), November 7–15, 1910, and May 18, 1913.

Faradje, 1 (♂ adult), December 2, 1911.

Niapu, 12 (8 ♂, 4 ♀, all adult), November 14–25, 1913.

Collectors' Measurements of Thirty-five Adults

Locality	No. of Specimens	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
Stanleyville	7	284(271–300)	127(119–135)	158(150–170)	35.0(34–36)	13.0(12–14)
Avakubi	5	277(269–287)	125(122–128)	156(147–165)	34.5(33–37)	13.3(12–14)
Niapu	12	276(267–292)	127(120–137)	148(130–159)	32.6(31–35)	13.6(12–15)
Medje	6	282(275–283)	126(123–130)	154(152–158)	34.0(33–36)	13.6(13–14)
Niangara	5	275(252–294)	128(121–141)	149(141–156)	33.4(31–35)	13.0(12–14)

Skull Measurements (Thirty-three of the Specimens in Table Above)

Locality	No. of Specimens	Greatest Length	Zygomatic Breadth
Stanleyville	6	35.0 (34.3–35.9)	19.5 (19.1–19.7)
Avakubi	5	33.8 (33.1–34.8)	19.4 (19.1–19.7)
Niapu	12	34.4 (33.1–35.0)	19.1 (18.3–19.6)
Medje	5	34.2 (33.7–34.9)	19.3 (18.6–19.7)
Niangara	5	34.2 (32.9–34.9)	19.2 (18.5–19.8)

The discrepancies in the average size at the different localities given in the table is doubtless ascribable to differences in the average age of the specimens.

This large series, from a wide range of localities, is astonishingly uniform in coloration, Stanleyville and Niangara specimens being indistinguishable. Season and age appear to exert little influence on coloration of adults, excluding a few specimens in obviously worn pelage. In two nurslings the general coloration of the upperparts is slightly more yellowish than in adults and the black dorsal stripes are more sharply defined, owing to the shortness of the pelage.

Tamiscus alexandri (Thomas and Wroughton)

Funisciurus alexandri Thomas and Wroughton, 1907, Ann. Mag. Nat. Hist., (7) XIX, May, p. 376. Type locality, Gudima, Iri River, Upper Uele (2 specimens).

Paraxerus alexandri Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473. Medje (4), Poko (1 specimen).

Tamiscus alexandri Thomas, 1918, Ann. Mag. Nat. Hist., (9) I, January, p. 37.

Represented by 19 specimens (8♂, 11 ♀), from 8 localities (Avakubi to Faradje), collected as follows:

Avakubi, 4 (1 ♂, 3 ♀, 3 adult, 1 ♀ embryo in alcohol), November 23, 1913, and January 3, February 22, September 3, 1914.

Ngayu, 2 (♀, ♂, adult), December 22, 24, 1909.

Gamangui, 5 (1 ♂, 4 ♀), January 28, February 8–11, 1910.

Medje, 2 (♂, ♀), April 1, May 25, 1914.

Pawa, 1 (♂ adult), October 10, 1910.

Nala, 1 (♀ in alcohol), July 1913.

Rungu, 1 (♀ adult), October 28, 1910.

Faradje, 3 (♂, all adult), November 29, December 2, 1911.

Collectors' measurements of 4 adults (1 ♂, 3 ♀) from Gamangui: Total length, 215 (214–217); head and body, 105.5 (105–107); tail vertebræ, 110 (109–112); hind foot, 30 (29–31); ear, 14 (all 14).

Skulls of the same specimens and one other from same locality: Greatest length, 29.5 (29.3–29 9); zygomatic breadth, 17.8 (17.3–18.3).

Collector's measurements of 3 adult males from Faradje: Total length, 219 (212–226); head and body, 107 (104–109); tail vertebræ, 112.3 (108–117); hind foot, 29.7 (29–30); ear, 13 (12–14).

Skulls of the same specimens: Greatest length, 29.7 (29.5–29.9); zygomatic breadth, 17.9 (17.4–18.6).

Collectors' measurements of 9 specimens from other localities (Avakubi, 3; Pawa, 1; Rungu, 1; Medje, 2; Ngayu, 2): Total length, 217 (210–230); head and body, 104 (96–107); tail vertebræ, 112 (103–118); hind foot, 29.9 (29–31); ear, 13.5 (12–15).

Skulls, 8 of the same specimens: Greatest length, 28.9 (28.1–29.4); zygomatic breadth, 17.4 (16.9–17.7).

The middle of the back between the dark stripes is pale fulvous, yellower than the sides of body, bordered on each side by a black and a dull yellowish white stripe, and in many specimens indistinct traces of a short blackish stripe outside of the whitish one. In the November, December, January, and February specimens the black and white stripes are sharply defined but in April, May, and October they are usually much less distinct owing to fading and wear. The white border of the ears is at all times a conspicuous feature.

PROTOXERUS Major

Protoxerus (subgenus of *Xerus*) MAJOR, 1893, Proc. Zoöl. Soc. London, (June 1), p. 189, Pl. VIII, figs. 7, 8, Pl. IX, figs. 7, 8. Genotype, by subsequent designation (Thomas, 1897), *Sciurus stangeri* Waterhouse.

Protoxerus stangeri centricola (Thomas)

Sciurus stangeri centricola THOMAS, 1906, Ann. Mag. Nat. Hist., (7) XVIII, October, pp. 295, 297. Type locality, Katabi, Entebbe, Uganda (6 specimens).

Protoxerus stangeri centricola THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 473. Moera (3), Alimasi (2), Mawambi (2), "Poko"[1] (13 specimens), Belgian Congo.

Represented by 54 specimens (30 males, 24 females); all adult but 4; among them 2 skeletons and 2 alcoholic; taken as follows:

Stanleyville, 1 (♂), September 30, 1914.

Kamunionge, southeast of Bafwasende, 1 (♂), September 21, 1909.

Avakubi, 5 (1 ♂, 2 ♀), June 4, August 11, 26, 1914; (2 ♂, alcoholic), August 20, 24, 1914.

Ngayu, 7 (3 ♂, 4 ♀), December 11–23, 1909.

Bafwabaka, 2 (♂, ♀), December 30, 1909, and January 7, 1910.

Gamangui, 4 (3 ♂, 1 ♀), January 29, and February 8, 9, 20, 1910.

Medje, 6 (2 ♂, 4 ♀), January 20, 23, March 15, September 10, 15, 1910, and February 27, 1914.

Niapu, 20 (12 ♂, 8 ♀), November 14–30, December 2, 19, 1913, and January 2, 1914.

Akenge, 5 (2 ♂, 3 ♀), October 1–17, 1913.

Niangara, 2 (♂, ♀), November 12, 19, 1910.

Faradje, 1 (♂), November 30, 1911.

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[1] Mr. Lang believes that Dr. Christy's specimens recorded as from "Poko" were really taken in the forest belt, farther south, toward Niapu.

As indicated above, 20 of the 54 specimens were taken at Niapu, all but three during the last half of the month of November; all were adults in fresh pelage. Niapu is about 60 miles south of Poko, from which locality a large series collected by Dr. Christy has been referred by Thomas (*loc. cit.*, 1915, p. 473) to this subspecies.

Collectors' measurements of the Niapu series (12 males, 8 females):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	587 (551–628)	284 (271–309)	301 (270–350)	69.8 (65–75)	22.3 (21–24)
♀	591 (584–611)	283 (277–297)	307 (300–314)	69.8 (65–73)	22.0 (21–23)

Skulls, same specimens:

	Greatest Length (=occipito-nasal length)	Zygomatic Breadth (=greatest breadth)
♂	67.23 (64.8–68.7)	37.5 (35.8–38.5)
♀	66.6 (64.6–68.7)	37.6 (36.3–38.1)

Collectors' measurements of 15 adults (8 males, 7 females) from other localities (Avakubi 3, Bafwabaka 1, Stanleyville 1, Gamangui 3, Kamunionge 1, Medje 3, Ngayu 1, Niangara 2):

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	577 (557–590)	280 (261–296)	290 (277–314)	69.0 (68–71)	22.0 (21–24)
♀	586 (570–610)	290 (284–296)	292 (280–315)	68.4 (65–71)	21.7 (20–23)

Skulls, same specimens:

	Greatest Length (=occipito-nasal length)	Zygomatic Breadth (=greatest breadth)
♂	66.5 (64.6–67.0)	36.7 (35.5–37.8)
♀	66.2 (64.5–68.5)	36.8 (35.4–38.0)

The external measurements of the head, body, and tail[1] of the type of *centricola* (an old female from Entebbe), "taken on the skin," considerably exceed the averages given above, but the foot, allowing 5 or 6 mm. for the claws, is about equal to the smallest records of our specimens measured in the field, and the greatest length of the skull (66.5 mm.) differs less than a millimeter from the average of the 35 adult specimens from the Belgian Congo given above.

The coloration of this large series is rather uniform, half-grown specimens differing scarcely at all from the adults. A few of the latter, in somewhat worn pelage, are a little pale from evident bleaching. The extension of the gray of the dorsal region forward upon the head varies somewhat, in some specimens gray-tipped hairs covering the crown as far as the eyes, in others only as far as the front base of the ears.

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[1] "Head and body (overstretched) 310 mm.; tail, 330; hind foot, 61."

Protoxerus stangeri signatus Thomas

Protoxerus stangeri signatus Thomas, 1910, Ann. Mag. Nat. Hist., (8) V, January, p. 85. Type locality, Lodja, Upper Lukenie River, Belgian Congo.

A single specimen from Bolobo (skin without skull), presented to the Expedition by Dr. Gerling, is apparently referable to this form which, as indicated by the description based on the type specimen from Lodja, it closely resembles. The type locality is some 400 miles east of Bolobo. The differences from the series of *P. s. centricola* as recorded above are slight and it is here recognized mainly on geographical grounds.

Euxerus Thomas

Euxerus Thomas, 1909, Ann. Mag. Nat. Hist., (8) III, June, p. 473. Genotype, by original designation, *Sciurus erythopus* Geoffroy.

Euxerus erythopus lacustris (Thomas)

Xerus erythropus lacustris Thomas, 1905, Ann. Mag. Nat. Hist., (7) XV, April, p. 388. Masindi, Unyoro.

Euxerus erythropus lacustris Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 474. "Panga" (near Poko) (3), Poko (8 specimens).

Represented by 30 specimens, collected as follows:

Faradje, 20 (2 ♂ and 10 ♀ adults, 1 nursling, 7 one-fourth to one-third grown), February 20, 22, 26, March 4, 5, 14, 31, April 3, 11, 29, 30, May 27, June 29, September 3, 11, 1911, October 16, December 14, 1912, January 10, 12, 1913.

Niangara, 9 (2 adult, 7 immature, of which 5 are nurslings), November 12–28, December 22, 1910, and January 2, 1911.

Rungu, 1 (♂ adult), January 30, 1913.

Collectors' measurements of 11 adults (2 males, 9 females) from Faradje: Total length, 492 (474–515); head and body, 282 (259–297); tail vertebræ, 209 (189–230); hind foot, 72 (68–75); ear, 18.8 (18–20).

Skulls, same specimens: Greatest length, 65.1 (63.6–67.2); zygomatic breadth, 34.2 (33.7–34.6).

The three localities at which specimens were taken are all in the open districts of the savannah in the northeastern Belgian Congo.

Young specimens a few weeks old are similar in coloration to the adults, the pattern being the same, but a little lighter in tone, the light tips to the hairs of the upperparts, owing to the shortness of the pelage, concealing the darker basal portion. The tail, however, is externally white, the long white tips of the hairs usually wholly concealing the broad subapical black zone of the tail hairs. Later, as the animal increases in size, the black base of the hairs forms a narrow black median line on both the upper and the lower surfaces of the tail; still later, in specimens one-third to half grown, both surfaces of the tail are grizzled black and white, with the sides and tip white, and the body pelage, in texture and coloration, has become like that of adults, the juvenal coat having been replaced by molt.

ANOMALURIDÆ

The one hundred and twenty-five specimens of Anomaluridæ represent three of the four superspecific groups of this family proposed by Matschie in 1914,[1] and are referable to three forms.

ANOMALURUS Waterhouse

Anomalurus WATERHOUSE, 1842, Ann. Mag. Nat. Hist., X, pp. 201, 202; 1842, Proc. Zoöl. Soc. London, (January 1843), pp. 124–127. Genotype, by monotypy (also by original designation), *Anomalurus fraseri* Waterhouse.

Aroathrus WATERHOUSE, 1842, Proc. Zoöl. Soc. London, (January 1843), p. 124, footnote. Substitute name to replace *Anomalurus* Waterhouse in case the latter is found to be preoccupied.

Anomalurus, as restricted by Matschie (*loc. cit.*, 1914), includes about a dozen forms, the greater part of which are subspecies of *A. fraseri*.

Anomalurus jacksoni jacksoni de Winton

Anomalurus jacksoni DE WINTON, 1898, Ann. Mag. Nat. Hist., (7) I, March, p. 251. Ntebe (=Entebbe), Uganda.

Anomalurus jacksoni THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Moera (1), Medje (2), Poko (5 specimens).

Represented by 58 specimens (25 males, 29 females, all adult but 3, including 4 in alcohol, 4 skeletons, and a skull), collected as follows:

Avakubi, 2 (♂, ♀ in alcohol), March 31, April 14, 1914.

Medje, 28 (12 ♂, 13 ♀; 2 in alcohol, 4 skeletons), January 20–24, March 6–21, April 9–26, May 2, August 1, 3, September 9, 16, October 6, 1910.

Gamangui, 1 (skull only), February 1, 1910.

Niapu, 16 (10 ♂, 6 ♀), November 12–18, December 2–19, 1913.

Akenge, 7 (♂, 6 ♀—1 ♀, embryo in alcohol), September 29–30, October 9, 11, 28, 31, 1913.

Panga, 4 (♂, 3 ♀), September 14–18, 1914.

Collectors' measurements of 16 adult specimens (9 ♂, 7 ♀) from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	549 (518–563)	317 (296–332)	237 (228–250)	61 (58–63)	38.5 (36–41)
♀	582 (559–621)	331 (319–342)	258 (240–280)	63 (62–65)	40.0 (39–41)

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[1] 'Ein neuer *Anomalurus* von der Elfenbeinküste.' Von Paul Matschie. 1914, Sitzungsb. Ges. naturf. Freunde Berlin, No. 7, July, pp. 349–351. (1) *Anomalurus* Waterhouse, (2) *Anomalurodon*, (3) *Anomalurops*, (4) *Anomalurella*.

Skulls, same series:

	Occipito-nasal Length	Zygomatic Breadth
♂	55.6 (53.5–57.3)	36.9 (35.0–38.0)
♀	57.1 (53.5–58.8)	38.3 (35.0–39.8)

Collectors' measurements of 15 adult specimens (8 ♂, 7 ♀) from Niapu:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	559 (540–570)	313 (298–323)	248 (222–267)	60.4 (58–65)	37.6 (35–39)
♀	582 (554–628)	311 (301–344)	261 (252–284)	61.3 (62–64)	38.1 (36–40)

Skulls, same series:

	Occipito-nasal Length	Zygomatic Breadth
♂	56.3 (55.2–57.8)	37.5 (36.1–38.0)
♀	57.2 (56.0–58.9)	37.5 (36.8–38.4)

The three adults (1 ♂, 2 ♀) from Panga agree in proportions and measurements with the Medje and Niapu specimens. The single specimen from Avakubi is a young adult male.

In compiling the measurements given above only specimens in which the dentition was fully mature were used; but while the relative number with unworn teeth varies in the different categories, and tends to lower the average for the series when they predominate, this factor, in the present series, does not account for the slightly larger average size of the females in the above statistical summaries. In the discarded specimens the last molar was not fully developed, varying in different specimens from just breaking the alveolus to one-half to two-thirds full height, but still unpigmented. In such specimens the total length of the skull ranges from 50 to 53 mm., as against 55 to 58 mm. in adults.

ANOMALURELLA Matschie

Anomalurella MATSCHIE, 1914, Sitzungsb. Ges. naturf. Freunde Berlin, July, p. 351. Genotype, by original designation, *Anomalurus pusillus* Thomas.

Anomalurella pusilla (Thomas)

Anomalurus pusillus THOMAS, 1887, Ann. Mag. Nat. Hist., (5) XX, December, p. 440; 1888, Proc. Zoöl. Soc. London, p. 8, Pl. I, animal. Bellima, 1 ♀ (type); Tingasi, 1 ♂.

Anomalurus pusillus THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Moera (1), Medje (4), Poko (7 specimens).

Represented by 53 specimens (21 ♂, 29 ♀), of which 5 are immature (but none very young), 2 are skulls only, 4 skeletons, and 2 in alcohol, collected as follows:

Avakubi, 1 (♀), September 18, 1913.
Ngayu, 2 (2 ♀), December 17, 20, 1909.

Medje, 36 (12 ♂, 21 ♀—2 ♂, 2 ♀ immature, 2 skulls, 4 skeletons, 1 embryo in alcohol), January 16–26, March 8–26, April 4–27, May 14, June 30, August 18, October 7, 1910, March 23, June 25, 1914.

Niapu, 10 (7 ♂, 3 ♀), November 19, 24, 26, December 4–9, 16, 1913.

Akenge, 4 (2 ♂, 2 ♀), September 30, October 14, 16, 1913.

Collectors' measurements of 23 adults (7 ♂, 16 ♀) from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	371 (359–390)	227 (210–242)	144 (138–152)	43.0 (40–46)	29.8 (30–32)
♀	373 (357–401)	230 (212–246)	148 (141–157)	44.5 (40–47)	30.0 (30–32)

Skulls (10 ♂, 14 ♀), same series:

	Occipito-nasal Length	Zygomatic Breadth
♂	44.8 (43.6–46.6)	29.8 (28.0–30.9)
♀	45.2 (43.6–47.6)	29.9 (28.0–30.8)

Collectors' measurements of 9 adults (7 ♂, 2 ♀) from Niapu: Total length, 371 (353–382); head and body, 219 (213–227); tail vertebræ, 143 (130–147); hind foot, 43.7 (42–46); ear, 29.2 (28–30).

Skulls, same specimens: Occipito-nasal length, 45.1 (43.5–46.3); zygomatic breadth, 29.7 (28.3–30.2).

Very few of the specimens of the present series conform very closely in the coloration of the upperparts to the original description and accompanying colored plate of the species, of which it is said: "General colour above uniform dark grizzled gray, the tips of the hairs forming a terminal band of pale gray or olivaceous." In many specimens of the present series this "terminal band" is near ochraceous rufous, intensified in exceptional specimens to pale tawny. One specimen from Akenge may be noted as having the pelage of the back hazel for the terminal half or more of the hairs, recalling forcibly the dorsal region in *A. beldeni* Du Chaillu (=? *erythronotus* Milne-Edwards) but the red is browner. This specimen, however, is probably abnormal, as the new coat, coming in in patches, conforms to that of normal specimens.

Anomalurops Matschie

Anomalurops Matschie, 1914, Sitzungsb. Ges. naturf. Freunde Berlin, No. 7, July, p. 351. Genotype, by original designation, *Anomalurus beecrofti* Fraser.

This group includes six described forms, the greater part of which appear to be subspecies of *A. beecrofti*. The type locality of *A. beecrofti chapini*, described below, is far to the eastward of any previously known locality for the *beecrofti* group.

Anomalurops beecrofti chapini, new subspecies

Type, No. 50480, ♂ adult, Medje, Belgian Congo, May 6, 1910; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 861. Named for James P. Chapin.

Smaller and much lighter in color than *A. beecrofti citrinus* Thomas,[1] from Benito River, Spanish Guinea.

General color above (including membranes), yellowish gray; middle of back from occiput to sacral region with an irregular broad band of ochraceous orange, varied with black, the hairs individually (about 20 mm. in length) mouse-gray basally, passing gradually into a broad band of dull black, followed by a subapical band (5–6 mm. wide) of ochraceous orange and conspicuously tipped with black; hairs of upper surface of membrane for the antero-lateral fourth of the border rigid and intense black; a well-defined patch of white or buffy white at lateral base of ears, indistinctly merging by a downward sweep with the white or whitish half collar in front of shoulders, and the usual small tuft of partly concealed white hairs on occiput; front and sides of head dull gray or buffy gray, extending laterally to sides of throat; general color below (including membranes) ochraceous buff to base of hairs (varying in some specimens to light buff or even whitish), except on the throat and a broad median band thence to anal region (usually narrowing posteriorly) and the inside of thighs, which parts are intense orange-rufous in high-colored specimens, paler in others; basal third of tail and caudal membrane below like ventral surface, above like the lower back; apical two-thirds of tail dull brown, varying in different specimens from dark brown to pale fulvous brown and even cinnamon-brown; upper surface of feet dull grayish with a slight buffy suffusion; soles and palms naked, pale brown, as are the nose and apical two-thirds of ears.

Collectors' measurements of type: Total length, 512 mm.; head and body, 310; tail vertebræ, 202; hind foot, 59; ear, 29.

Measurements of skull (type): Greatest (occipito-nasal) length, 54.5; condyloincisive length, 51.4; zygomatic breadth, 34.4; least interorbital breadth, 18.4; breadth of brain-case, 26.3; length of upper toothrow, 11.9.

Collectors' measurements of 10 adults (5 ♂, 5 ♀), of which 8 are from Medje and 1 each from Poko and Akenge:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	512 (501–518)	301 (278–323)	211 (195–223)	59 (56–62)	31 (29–32)
♀	510 (475–555)	297 (277–330)	213 (198–226)	59 (58–60)	31 (29–32)

Represented by 14 specimens (8 ♂, 6 ♀, all adult but 2), collected as follows:

Medje, 12, (6 ♂, 6 ♀), March 13, April 9, 13, 27, 30, May 6, 8, September 24, October 12, 1910, February 28, 1914.

Poko, 1 (♂), August 22, 1913.

Akenge, 1 (♂), October 1, 1913.

Anomalurops beecrofti chapini is geographically nearest *A. beecrofti citrinus* Thomas (type from "Benito River, Spanish Guinea," collected by G. L. Bates), from which it differs in considerably smaller size and much less intense coloration. Fortunately I am able to make direct comparison of the Congo series with four topotypes[1] of *citrinus* also collected by Mr. Bates. As shown in the accompanying tabulated measurements, *A. b. citrinus* exceeds *A. b. chapini* in total length by about 50 mm., and about the same in head and body length, while there is very little difference in the length of the tail. (It is probable that these latter measurements were not taken by the same method in the two cases.) In skull length *citrinus* exceeds *chapini* by about 4 mm., with the other skull measurements proportionately different. The impression given by comparison of the two series is a greater size difference than the measurements indicate, the *citrinus* skulls being more heavily ossified, with stronger ridges for muscular attachment in skulls of equal age than is the case in *chapini*. The color differences are strongly marked. The "ochraceous olive" or "citrine drab" effect above in *citrinus* is replaced by light clear gray, or slightly yellowish gray, in *chapini*, with a corresponding difference in the tone of the median dorsal band; below the ferruginous tone is much darker in the former, approaching chestnut-red on the throat and median line in *citrinus* in place of orange-rufous in *chapini*.

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[1] *Anomalurus beecrofti citrinus* Thomas, 1916, Ann. Mag. Nat. Hist., (8) XVIII, August, p. 236. 'About a dozen specimens examined.'

The series of 14 specimens of *A. b. chapini* presents the usual wide range of individual variation in both size and coloration. The smallest specimen in cranial measurements is a female (skull, 51.8 × 32.9) in which all the cheek-teeth have attained full development but are unworn; in external measurements it is the largest of the females except one, which is much the largest specimen of the entire series (skull, 58.5 × 36.8) in both external and cranial measurements.

The color above varies from clear light gray to yellowish gray, and the rufous dorsal line is in some weakly developed or nearly obsolete, in others heavy and continuous from the crown to the hips. The broad rufous zone of the median underparts likewise varies greatly in extent and intensity—from orange-rufous to dark ferruginous, and the adjoining lateral parts from ochraceous orange to pale buff. Young specimens are much paler below than the adults. The white crown spot is nearly always plainly distinguishable and usually forms a distinct mark which is occasionally conspicuous. In one specimen it is a transversely-oval patch, 15 × 25 mm. in area. There is apparently no sexual difference in size or color.

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[1] Borrowed from the United States National Museum through the kindness of Mr. G. S. Miller, Jr., Curator of Mammals.

Collectors' Measurements

	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot	
Type[1] *A. b. citrinus*	Benito River, Spanish Guinea	♀	582	357	225	60	s.u.
84546 N. M. *A. b. citrinus*	“ “	♀	565	350	215	57	“
84547 “ “ “	“ “	♂	540	355	185	53	“
84548 “ “ “	“ “	♀	585	380	205	56	“
Average, 4 specimens			**568**	**361**	**208**	**56.5**	“
50477 *A. b. chapini*	Medje, Upper Congo	♀	515	305	210	58	c.u.
50480 “ “	“ “	♂	512	310	205	59	“
50481 “ “	“ “	♀	555	330	225	60	“
50482 “ “	“ “	♂	517	298	219	62	“
50483 “ “	“ “	♀	490	282	208	60	“
50610 “ “	“ “	♂	518	323	195	60	“
50485 “ “	Poko	♂	510	298	212	59	“
Average, 7 specimens			**517**	**305**	**211**	**60**	“

Measurements of Skulls

	Locality	Sex	Greatest Length	Zygom. Breadth	Upper Toothrow
Type[1] *A. b. citrinus*	Benito River, Spanish Guinea	♀	58.5	38.0	12.8
84546 N. M. *A. b. citrinus*	“ “	♀	59.5	38.3	13.0
84547 “ “ “	“ “	♂	60.5	38.4	13.2
84548 “ “ “	“ “	♀	59.7	38.3	13.0
84512 “ “ “	“ “	♀	58.0	37.4	11.5[2]
Average, 5 specimens			**59.2**	**38.1**	**13.0**
50477 *A. b. chapini*	Medje, Upper Congo	♀	55.2	35.8	12.6
50480 “ “	“ “	♂	54.3	33.8	12.2
50481 “ “	“ “	♀	58.5	36.8	12.7
50482 “ “	“ “	♂	56.4	36.2	12.5
50483 “ “	“ “	♀	52.6	35.5	12.0
50610 “ “	“ “	♂	55.0	36.3	11.7
50485 “ “	Poko	♂	55.1	33.8	11.8
Average, 7 specimens			**55.3**	**35.4**	**12.2**

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[1] From the author's description (*loc. cit.*)

[2] Toothrow abnormally short and omitted from the average.

IDIURIDÆ

The Idiuridæ, recently separated from the Anomaluridæ as a distinct family group by Miller and Gidley,[1] are represented by three quite different forms, two of which are here for the first time described.

IDIURUS Matschie

Idiurus MATSCHIE, 1894, Sitzungsb. Ges. naturf. Freunde Berlin, No. 8, August, pp. 194–200, 1 text-fig. Genotype, by monotypy, *Idiurus zenkeri* Matschie.

Idiurus zenkeri zenkeri Matschie

Idiurus zenkeri MATSCHIE, 1894, Sitzungsb. Ges. naturf. Freunde Berlin, No. 8, October 16, p. 197, text fig. p. 198 (animal). Type locality, Yaunde Station, Cameroon District, West Africa. One specimen.

Represented by 30 specimens (22 skins with skulls, 8 in alcohol), collected as follows:

Medje, 27 (14 ♂, 13 ♀; 21 skins and skulls, 6 in alcohol), January 21, 25, March 9, 16, 1910.

Avakubi, 1 (♀, skin and skull), January 22, 1914.

Niapu, 2 (1 ♂, 1 ♀, in alcohol), January 27, 1914.

Collectors' measurements of 19 adults (10 males, 9 females) from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	170 (165–175)	71 (64–78)	99 (93–104)	17.0 (16–18)	13.6 (12–14)
♀	173 (160–187)	73 (65–86)	101 (95–108)	17.3 (16–18)	13.4 (12–14)

Measurements of 14 skulls (7 males, 7 females), from the same series:

	Greatest (=occipito-nasal) Length	Zygomatic Breadth
♂	21.0 (20.5–21.3)	12.2 (11.5–12.8)
♀	21.4 (21.1–21.8)	12.4 (11.9–12.8)

This fine series, particularly the 21 skins from Medje, throws much light upon questions of individual, sexual, and seasonal variation. The measurements, both external and cranial, indicate a slightly larger average size for females than males, but there is no recognizable sexual difference in coloration.

The range of color variation is considerable in the Medje specimens taken at the same date, due largely to the condition of the pelage in respect to wear, the general tone of the coloration becoming darker as the tips of the hairs wear off, showing more of the basal fur, while the hair-tips become paler by fading. Comparison of the twelve specimens taken March 16 with the eight taken January 25, shows that the latter average darker in general effect and the hair-tips paler, yet certain specimens of the January series can be matched exactly by the paler specimens of the March series. The hair-tips on the back of the brighter colored examples of the March series are near snuff-brown, varying in intensity in different individuals, and about cinnamon-buff on the ventral surface, but often nearly wanting through wear, as in the single Avakubi specimen taken January 22, the most worn of any of the entire series of twenty skins.

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[1] 'Synopsis of the supergeneric groups of Rodents.' Gerrit S. Miller, Jr., and James W. Gidley, 1918, Journ. Washington Acad. Sci., VIII, No. 13, July 19, p. 422.

A single skin and skull[1] of *I. zenkeri*, from the southern Cameroon, and thus practically a topotype, is rather darker than the average of the Medje series, but differs so little from some of them that they are provisionally referred to this species. Their relationship to *I. zenkeri kivuensis*, recently described by Lönnberg,[2] is not at present determinable. It appears to be a much darker form than typical *zenkeri*.

Idiurus langi, new species

Plate V

Type, No. 50542, ♂ adult, Medje, Belgian Congo, March 16, 1910; Herbert Lang and James P. Chapin, American Museum Congo Expedition. Orig. No. 737. Named for Herbert Lang, leader of the American Museum Congo Expedition.

Size of and proportions nearly as in *Idiurus macrotis* Miller, but very different in coloration.

Upperparts (type, in fresh, unworn pelage) washed with clay-color (Ridgway, 1912), strongest on middle of back, less heavily on lower back and sides; in worn pelage much paler (about cinnamon-buff), the light hair-tips partly worn off (almost wholly on lower back and sides); pelage of middle of back (in fresh coat), 11.5 mm. in length, the buffy tips about 2 mm. long, followed by a dark zone of about equal width, the basal two-thirds "mouse-gray." Underparts heavily washed with warm buff, almost wholly concealing the light neutral gray of the basal fur (varying in different specimens, especially when worn) to a faint wash of lighter tone); a conspicuous pale yellowish white patch on sides of nose extending from base of rictal bristles to the naked nose pad, about 4 × 6 mm. in extent; chin and interramal region white or pale yellowish white; upper surface of membranes thinly clothed with brownish black hairs, under side nearly naked; membranes and ears pale brownish (ears in some specimens slightly darker brown); feet and greater part of tail yellowish brown, the long tail hairs dark brown with a faint tone of chestnut, much less dark than in *I. macrotis*. The scale pad on the ventral base of the tail is much longer than in *macrotis* (given as 17 mm.), varying from 20 to 25 mm. in length, and the scales are larger and tend to form regular rows, and beyond what may be considered as the "scale pad" proper, the annulations on the lower surface of the tail are conspicuous and roughened, so that in some specimens it is difficult to determine what should be regarded as the apical end of the pad, as distinguished from the annulations. The fringes on outer edge of both fore and hind feet, the small tufts of whitish bristly hairs at tarsal and metatarsal joints, the tail fringes, and the scattered long hairs in the dorsal pelage, are evidently generic characters, being common to the three forms of *Idiurus* here under consideration.

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[1] No. 125438, U. S. Nat. Mus., ♀, Efulen, Bulu Country, Cameroon, July 21, 1903, coll. G. L. Bates.

[2] 1917, Kungl. Svens. ventensk. Akad. Handl., LVIII, No. 2, September, p. 67. Masisi, Belgian Congo, about forty miles northwest of Lake Kivu. Two specimens, adult and young.

Collectors' measurements of the type[1]: Total length, 224 mm.; head and body, 94; tail vertebræ, 130; hind foot, 20; ear, 18.

Collectors' measurements of type and 4 topotypes (all adult males): Total length, 218 (207–224); head and body, 91 (86–94); tail vertebræ, 129 (124–133); hind foot, 21 (20–22); ear, 15.7 (14–18).

Skull (measurements of type[1]): Greatest length, 26; zygomatic breadth, 16; least breadth of frontals,[2] 6.6; greatest breadth of nasals,[2] 3.2; upper toothrow, 3.5; distance between inner bases of m^3, 1.4; do. m^1, 1.1; greatest length of mandible, 16.4; greatest depth (at coronoid), 10.2; lower toothrow, 4.

Skull (type and same 4 topotypes): Greatest length, 25.8 (25.1–26.2); zygomatic breadth, 15.5 (15.0–16.0).

Represented by 6 adult males, all of which are skins with skulls, and 1 adult female in alcohol, all taken at Medje, January 25 (5 specimens) and March 16 (2 specimens), 1910.

The type is the only specimen in fresh, wholly unworn pelage. All the others show more or less wear, especially on the lower back and sides, and they vary much in the amount of buffy wash, both above and below, and form a graduated series from clay-color to a pale tone of buff on the upperparts, and on the lower parts from a strong yellowish wash to only a faint pale tone where the hair-tips are least worn. The two March 16 specimens differ greatly from each other in coloration and amount of wear; the January series of skins (all taken January 25) differs similarly in respect to amount of wear and consequent tones of color on both upper and lower surfaces.

Idiurus langi is smaller than *I. macrotis* in external measurements, but the cranial measurements are practically the same. It differs, however, strikingly in coloration, both above and below, the general color being much lighter, especially in respect to the basal fur, ears, and membranes. *I. langi* differs from *I. panga* in much larger size and in coloration, especially of the ventral surface, which has a pinkish tone in *panga* instead of yellowish, and the upper surface is much more heavily washed with buff. The yellowish white, sharply defined nose spot of *langi* will alone readily distinguish it at a glance from either *macrotis* or *panga*.

Idiurus panga, new species

Type, No. 50605, ♀ adult, Panga, Belgian Congo, September 18, 1914; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 2552.

Similar to *Idiurus macrotis* Miller[3], but much smaller and considerably paler throughout, including the basal fur.

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[1] For measurements of *I. macrotis* see p. 71, where they are given in comparison with *I. panga*.

[2] Fronto-nasal sutures solidly ankylosed and indistinguishable, so that length of frontals and nasals cannot be given.

[3] *Idiurus macrotis* Miller, 1898, Proc. Biol. Soc. Washington, XII, pp. 73–76, figs. 15–19 (skull, ear, foot, and tail). Efulen, Cameroon District, West Africa.

Upperparts (in comparison with a para-topotype of *I. macrotis*) with the hairs narrowly tipped with light drab (instead of "sepia"), forming a slight wash of this tone, strongest on middle of back and sides of neck, darkened by the deep neutral gray (instead of dark plumbeous) underfur, which color predominates over the lower back and flanks; underparts superficially pale vinaceous buff (instead of yellowish wood-brown), the basal fur dark gull-gray (instead of plumbeous); upper surface of membranes thinly clothed with dusky brown hairs (less dark than in *macrotis*, as are also the membranes themselves); ears, feet, and base of tail also much lighter than in *macrotis*.

Collectors' measurements of type: Total length, 209 mm.; head and body, 73; tail vertebræ, 126; hind foot, 20 (20.5 in dry skin); ear, 18.

Collectors' measurements of the type and 3 topotypes (1 male, 3 females): Total length, 206 (199–212); head and body, 80.5 (73–87); tail vertebræ, 123 (117–128); hind foot, 20.5 (18–21); ear, 17.3 (17–18).

Corresponding measurements of the type and topotype (2 males) of *macrotis*, as given by the author (*loc. cit*): Total length, type 241, topotype, 228; head and body, 108, 105; tail vertebræ, 133, 123; hind foot, 21, 22; ear, 16, 15.5.

Skull (measurements of type, with measurements of type and topotype of *macrotis* in parentheses): Greatest length, 25 (26, 27); zygomatic breadth, 14.9 (15, 16); length of frontals,—[1] (96, 98); least width of frontals, 6.5 (7, 7); length of nasals,—[1] (7, 7); greatest breadth of nasals, 3.1 (3.25, 3.3); upper toothrow, 3.5 (3.8, 4); greatest distance between molars at m^3, 1.5 (2.2, 2); least distance between molars at m^1, 1 (1.2, 1.2); greatest length of mandible, 14.9 (15, 16); greatest depth (at coronoid), 9.7 (10, 10.6); lower toothrow, 3.7 (4, 4).

Skull (type and 3 topotypes): Greatest length, 25.0 (24.–25.6); zygomatic breadth, 14.5 (14.2–14.9).

Represented by 4 specimens (1 ♂, 3 ♀), all from Panga and all collected the same day, September 18, 1914. All are old adults, with the dentition fully mature and the fronto-nasal sutures fully ankylosed and wholly indistinguishable.

Idiurus panga is a member of the *I. macrotis* group and is so different from the *I. zenkeri* group as to need no comparison with it. It differs from *macrotis* in smaller general size, much less heavy skull and correspondingly weaker dentition. Also in the much paler hair-tips above, the decidedly pinkish tone of the underparts, and the lighter color of ears, membranes and feet, and also of the basal underfur, both above and below. The ears appear to be decidedly larger than in *macrotis*, as indicated by the field measurements and by direct comparison with the para-topotype loaned me for examination through the kindness of the describer of the species.

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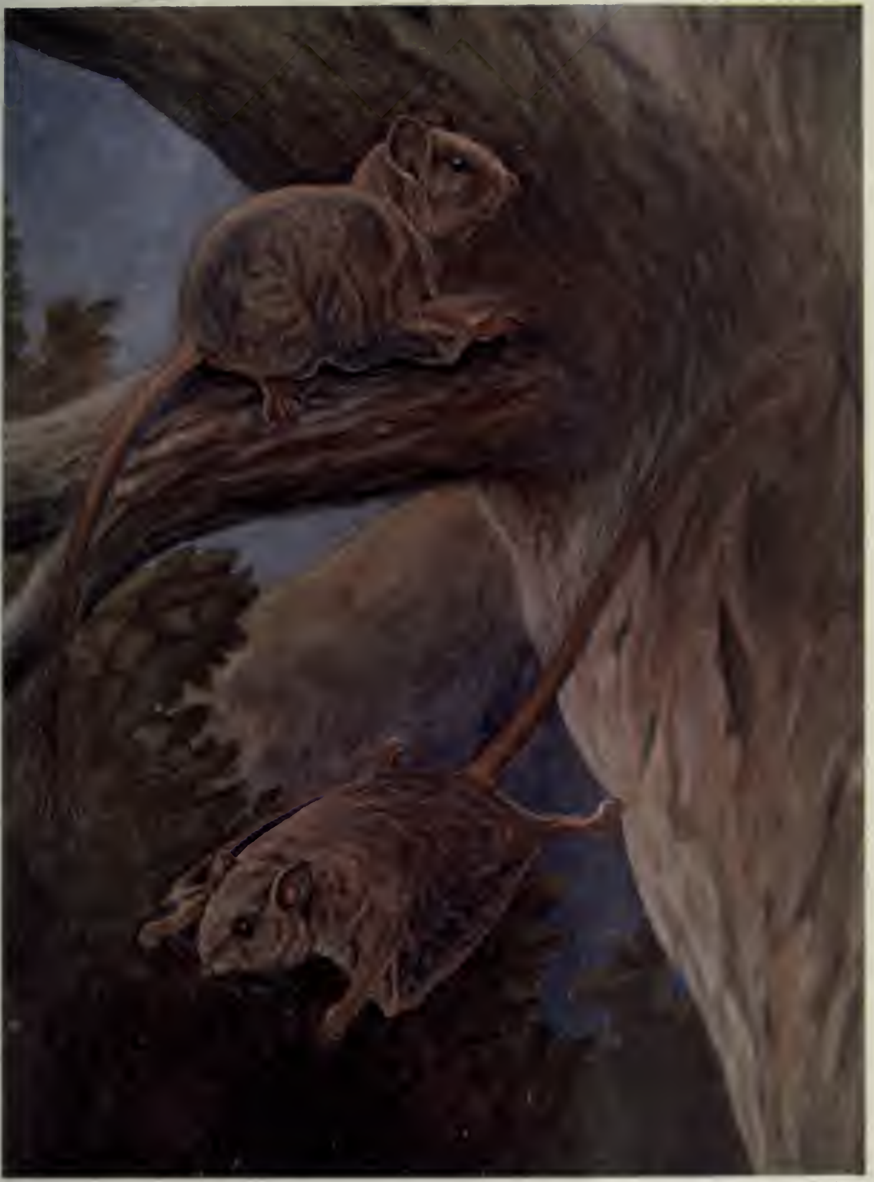
[1] Fronto-nasal sutures fully ankylosed and indeterminable.



Drawn by Richard Deckert

Idiurus langi J. A. Allen.   Medje
(About one-half natural size)

59.7,4(67.5)

Article III.—CARNIVORA COLLECTED BY THE AMERICAN MUSEUM CONGO EXPEDITION[1]

BY J. A. ALLEN[2]

PLATES VI TO LXXVIII, TEXT FIGURES 1 TO 67, AND MAP

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[1] Scientific Results of the Congo Expedition. Mammalogy, No. 8.

[2] Dr. Allen died in 1921. This paper is now published essentially as Dr. Allen left it, except for certain necessary changes made by Mr. Lang and the addition of figures made under Mr. Lang's supervision. Mr. Lang's fieldnotes and other data will be published separately.—EDITOR.

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INTRODUCTION

The Carnivora collected by Herbert Lang and James P. Chapin on The American Museum Congo Expedition,[1] number 588 specimens, of which 9 represent the Canidæ, 35 the Mustelidæ, 411 the Viverridæ, 13 the Hyænidæ, and 120 the Felidæ. The collection consists of 33 forms (29 species and 4 additional subspecies), with 2 genera and 8 forms new to science.

The comparative drawings of the skulls of the various genera were rendered possible through the interest and support of Professor Henry Fairfield Osborn, President of The American Museum of Natural History. They have been made in orthogon projection, thus insuring the greatest possible exactness in general comparison as well as in that of the component parts of the skull. Through the careful and painstaking work of Mrs. H. Ziska, who made these drawings under Mr. Lang's supervision, it was possible to attain a correctness which those who do not have the facilities to compare the actual skulls will appreciate.[2] Except where the contrary is indicated, the halftone illustrations of either living animals or of specimens in the flesh are from field photographs taken by Mr. Lang, those of skulls and skins, by Julius Kirschner; the colored plate of *Osbornictis* is by Mr. Richard Deckert.

In addition to the comparative material available in The American Museum of Natural History, much important material has been generously loaned by the authorities of the United States National Museum through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals, and is more fully accredited in the proper connection. I am also greatly indebted to Dr. T. S. Palmer, author of 'Index Generum Mammalium,' for transcripts from rare volumes, and for verification of references to works otherwise unavailable.

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[1] Preliminary notes on some of the carnivores of this collection were published by Dr Allen, 1919, Journ. Mammalogy, I, No. 1, November, pp. 23–31.

[2] Notes by Mr. Lang concerning these skulls and other matters connected with the Carnivora collected by the Congo Expedition will be published later.—EDITOR.

SPECIES AND SUBSPECIES, WITH THEIR LOCALITIES AND NUMBER OF SPECIMENS FROM EACH LOCALITY

Species and Subspecies	Localities	Specimens
Canidæ		
1. *Thos anthus soudanicus*	Bafuka 1, Faradje 4, Niangara 4	9
Mustelidæ		
2. *Mellivora capensis cottoni*	Niapu 2, Vankerckhovenville 1	3
3. *Lutra maculicollis*	Avakubi 1, Faradje 5, Niapu 3	9
4. *Aonyx capensis*	Avakubi 1, Faradje 21, Niapu 1	23
Viverridæ		
5. *Civettictis civetta orientalis*	Akenge 7, Avakubi 2, Faradje 1, Medje 6, Niangara 2, Niapu 14	32
6. *Genetta pardina fieldiana*	Aba 1, Akenge 4, Avakubi 1, Faradje 18, Medje 17, Niangara 3, Niapu 1, Stanleyville 1	46
7. *Genetta servalina*	Akenge 6, Bafuka 1, Faradje 9, Ibambi 1, Medje 7, Niangara 7, Niapu 23	54
8. *Genetta stuhlmanni*	Lake Kivu 1	1
9. *Genetta victoriæ*	Akenge 1, Medje 3, Niapu 24, unknown locality 2	30
10. *Osbornictis piscivora*	Manamama (near Bafwabaka) 1, Niapu 1	2
11. *Poiana richardsoni ochracea*	Akenge 1, Medje 2, Niapu 1	4
12. *Nandinia binotata*	Akenge 15, Boyulu 1, Medje 20, Niangara 6, Niapu 30, Poko 1	73
13. *Herpestes ichneumon parvidens*	Niangara 1	1
14. *Herpestes ichneumon funestus*	Akenge 1, Faradje 2, Medje 3, Stanleyville 1	7
15. *Galerella ochracea ochracea*	Faradje 8, Niangara 1	9
16. *Helogale hirtula robusta*	Aba 2, Faradje 6, Niangara 1, Vankerckhovenville 1	10
17. *Mungos gothneh*	Akenge 1, Faradje 19, Niangara 2	22
18. *Crossarchus alexandri*	Akenge 17, Gamangui 3, Medje 1, Niapu 44, Poko 1	66
19. *Ichneumia leucura ibeana*	Faradje 5, Niangara 3	8
20. *Xenogale microdon*	Akenge 4, Avakubi 2, Medje 6, Niapu 4	16
21. *Atilax robustus*	Faradje 4	4
22. *Atilax macrodon*	Akenge 2, Medje 2, Niapu 13	17
23. *Bdeogale nigripes*	Akenge 2, Niapu 7	9
Hyænidæ		
24. *Crocuta crocuta fortis*	Faradje 13	13

Felidæ

25.	*Leo leo azandicus*	Faradje 14, Vankerckhovenville 1	15
26.	*Panthera pardus chui*	Bafuka 1, Faradje 24, Garamba 3, Vankerckhovenville 1	29
27.	*Panthera pardus iturensis*	Akenge 6, Gamangui 2, Medje 3, Niapu 7, Poko 2	20
28.	*Leptailurus serval faradjius*	Faradje 14, Niangara 2	16
29.	*Leptailurus ogilbyi pantasticta*	Faradje 7	7
30.	*Leptailurus ogilbyi larseni*	Zambi 1	1
31.	*Profelis aurata cottoni*	Akenge 2, Avakubi 1, Medje 2, Niangara 1, Niapu 1	7
32.	*Felis ocreata rubida*	Faradje 15, Niangara 8, Poko 1	24
33.	*Felis ocreata ugandæ*	Garamba 1	1

LIST OF LOCALITIES, WITH NAMES OF THE SPECIES AND SUBSPECIES, AND NUMBER OF SPECIMENS TAKEN AT EACH LOCALITY

Localities	Species and Subspecies	No. of Specimens	Totals
Aba	*Genetta pardina fieldiana*	1	
"	*Helogale hirtula robusta*	2	3.
Akenge	*Civettictis civetta orientalis*	7	
"	*Genetta pardina fieldiana*	4	
"	*Genetta servalina*	6	
"	*Genetta victoriæ*	1	
"	*Poiana richardsoni ochracea*	1	
"	*Nandinia binotata*	15	
"	*Herpestes ichneumon funestus*	1	
"	*Mungos gothneh*	1	
"	*Crossarchus alexandri*	17	
"	*Xenogale microdon*	4	
"	*Atilax macrodon*	2	
"	*Bdeogale nigripes*	2	
"	*Panthera pardus iturensis*	6	
"	*Profelis aurata cottoni*	2	69
Avakubi	*Lutra maculicollis*	1	
"	*Aonyx capensis*	1	
"	*Civettictis civetta orientalis*	2	
"	*Genetta pardina fieldiana*	1	
"	*Xenogale microdon*	2	
"	*Profelis aurata cottoni*	1	8
Bafuka	*Thos anthus soudanicus*	1	
"	*Genetta servalina*	1	
"	*Panthera pardus chui*	1	3
Boyulu	*Nandinia binotata*	1	1
Faradje	*Thos anthus soudanicus*	4	
"	*Lutra maculicollis*	5	

Faradje	*Aonyx capensis*	21	
“	*Civettictis civetta orientalis*	1	
“	*Genetta pardina fieldiana*	18	
“	*Genetta servalina*	9	
“	*Herpestes ichneumon funestus*	2	
“	*Galerella ochracea ochracea*	8	
“	*Helogale hirtula robusta*	6	
“	*Mungos gothneh*	19	
“	*Ichneumia leucura ibeana*	5	
“	*Atilax robustus*	4	
“	*Crocuta crocuta fortis*	13	
“	*Leo leo azandicus*	14	
“	*Panthera pardus chui*	24	
“	*Leptailurus serval faradjius*	14	
“	*Leptailurus ogilbyi pantasticta*	7	
“	*Felis ocreata rubida*	15	189
Gamangui	*Crossarchus alexandri*	3	
“	*Panthera pardus iturensis*	2	5
Garamba	*Panthera pardus chui*	3	
“	*Felis ocreata ugandæ*	1	4
Ibambi	*Genetta servalina*	1	1
Lake Kivu	*Genetta stuhlmanni*	1	1
Manamama	*Osbornictis piscivora*	1	1
Medje	*Civettictis civetta orientalis*	6	
“	*Genetta pardina fieldiana*	17	
“	*Genetta servalina*	7	
“	*Genetta victoriæ*	3	
“	*Poiana richardsoni ochracea*	2	
“	*Nandinia binotata*	20	
“	*Herpestes ichneumon funestus*	3	
“	*Crossarchus alexandri*	1	
“	*Xenogale microdon*	6	
“	*Atilax macrodon*	2	
“	*Panthera pardus iturensis*	3	
“	*Profelis aurata cottoni*	2	72
Niangara	*Thos anthus soudanicus*	4	
“	*Civettictis civetta orientalis*	2	
“	*Genetta pardina fieldiana*	3	
“	*Genetta servalina*	7	
“	*Nandinia binotata*	6	
“	*Herpestes ichneumon parvidens*	1	
“	*Galerella ochracea ochracea*	1	
“	*Helogale hirtula robusta*	1	
“	*Mungos gothneh*	2	
“	*Ichneumia leucura ibeana*	3	
“	*Leptailurus serval faradjius*	2	
“	*Profelis aurata cottoni*	1	
“	*Felis ocreata rubida*	8	41

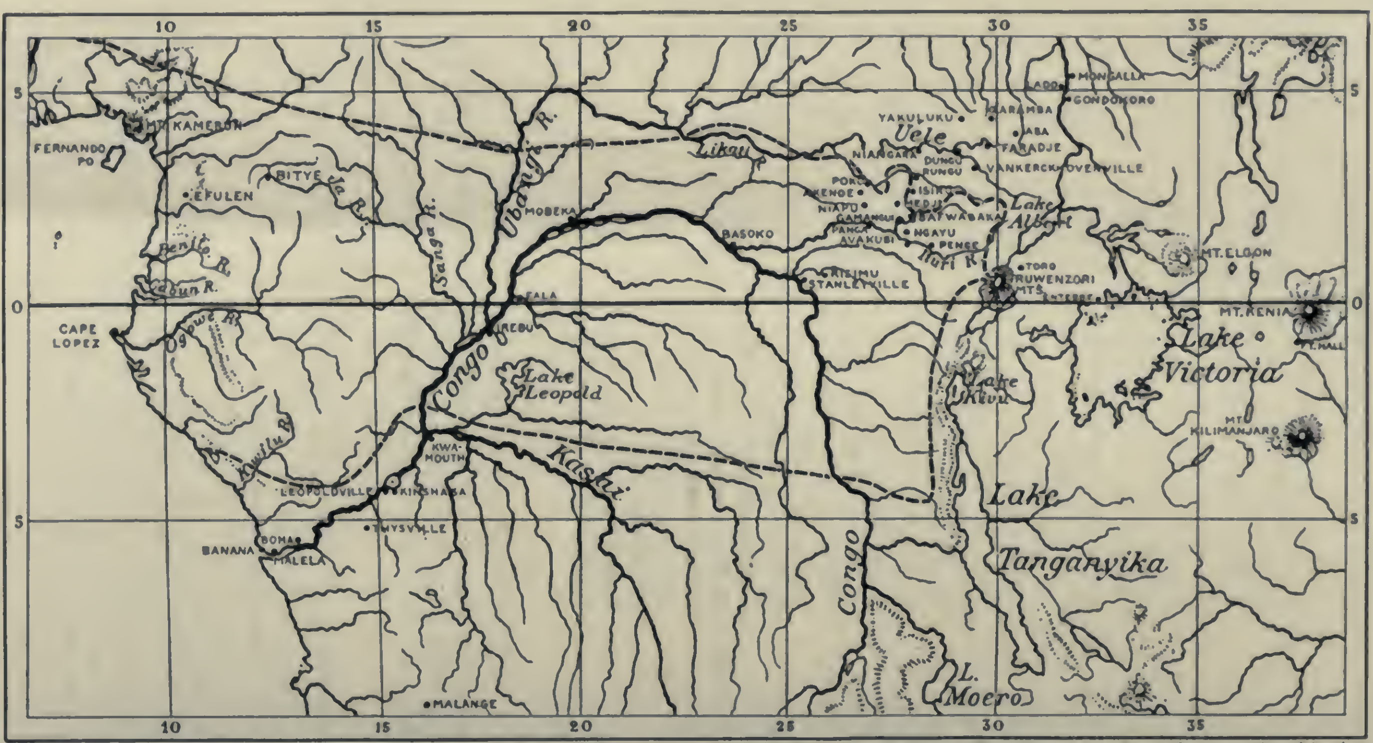
Niapu	*Mellivora capensis cottoni*	2	
"	*Lutra maculicollis*	3	
"	*Aonyx capensis*	1	
"	*Civettictis civetta orientalis*	14	
"	*Genetta pardina fieldiana*	1	
"	*Genetta servalina*	23	
"	*Genetta victoriæ*	24	
"	*Osbornictis piscivora*	1	
"	*Poiana richardsoni ochracea*	1	
"	*Nandinia binotata*	30	
"	*Crossarchus alexandri*	44	
"	*Xenogale microdon*	4	
"	*Atilax macrodon*	13	
"	*Bdeogale nigripes*	7	
"	*Panthera pardus iturensis*	7	
"	*Profelis aurata cottoni*	1	176
Poko	*Nandinia binotata*	1	
"	*Crossarchus alexandri*	1	
"	*Panthera pardus iturensis*	2	
"	*Felis ocreata rubida*	1	5
Stanleyville	*Genetta pardina fieldiana*	1	
"	*Herpestes ichneumon funestus*	1	2
Vankerckhovenville	*Mellivora capensis cottoni*	1	
"	*Helogale hirtula robusta*	1	
"	*Leo leo azandicus*	1	
"	*Panthera pardus chui*	1	4
Zambi	*Leptailurus ogilbyi larseni*	1	1
?	*Genetta victoriæ*	2	2

NEW GENERA WITH THEIR TYPE SPECIES

Micruonyx J. A. Allen. Type, *Lutra leptonyx* Horsfield = *Lutra cinerea* Illiger.
Osbornictis J. A. Allen. Type, *Osbornictis piscivora* J. A. Allen.
Xenogale J. A. Allen. Type, *Xenogale microdon* J. A. Allen.

NEW SPECIES AND SUBSPECIES, WITH THEIR TYPE LOCALITIES

1. *Osbornictis piscivora* J. A. Allen. Niapu.
2. *Helogale hirtula robusta.* Faradje.
3. *Xenogale microdon.* J. A. Allen. Akenge.
4. *Atilax macrodon.* Niapu.
5. *Crocuta crocuta fortis.* Faradje.
6. *Leo leo azandicus.* Vankerckhovenville.
7. *Leo leo hollisteri.* Lime Springs, Sotik, British East Africa.
8. *Panthera pardus iturensis.* Niapu.
9. *Leptailurus serval faradjius.* Faradje.



10
15
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FERNANDO PO
MT. KAMERUN
EFULEN
BITYE
Ja R.
Benito R.
Gabun R.
CAPE LOPEZ
Ogowe R.
Kwilu R.
BANANA
BOMA
MALELA
LEOPOLDVILLE
KINSHASA
THYSVILLE
KWA-MOUTH
MALANGE
Sanga R.
Ubangi R.
MOBEKA
Congo
LUKOLELA
IREBU
Lake Leopold
Kasai
Likati R.
BASOKO
STANLEYVILLE
KISIMU
Congo
YAKULUKU
Uele
NIANGARA
DUNGU
RUNGU
PORO
MEDJE
AKENGE
NIAPU
GAMANGUI
PANGA
AVAKUBI
ISIRO
MEDJI
BAFWABAKA
NGAYU
PENGE
Ituri R.
Lake Albert
GARAMBA
ABA
FARADJE
VANKERCKHOVENVILLE
LADO
MONGALLA
GONDOKORO
TORO
RUWENZORI MTS.
ENTEBBE
MT. ELGON
MT. KENIA
Lake Victoria
Lake Kivu
MT. KILIMANJARO
Lake Tanganyika
L. Moero

Map of the Congo and Lake Region of Africa, showing localities where carnivores were collected by the Congo Expedition, as well as others mentioned in the present paper. The limits of the West African rain forest are indicated by a broken line.

GENERAL SUMMARY

Families	Genera	Species and Subspecies	Specimens	Localities[1]
Canidæ	1	1	9	3
Mustelidæ	3	3	35	4
Viverridæ	14	19	411	16
Hyænidæ	1	1	13	1
Felidæ	5	9	120	13
	24	33	588	

CANIDÆ

Represented by only a single species, a jackal allied to a Sudan form.

THOS Oken

Thos OKEN, 1816, 'Lehrb. Naturg.,' Zool., Theil 3, Abth. 2, p. 1037. Type, by subsequent designation (Heller, 1914), *Thos vulgaris* Oken = *Canis aureus* Linnæus.

Thos anthus soudanicus (Thomas)

Plates VI; VII, Figure 1

Canis anthus soudanicus THOMAS, 1903, Proc. Zoöl. Soc. London, I, p. 295. Type locality, El Obeid, Kordofan. Skin and skull.

Represented by 9 specimens, 5 of which are immature, collected as follows:

Bafuka,[2] 1 (skull only, very old ♂), June 3, 1913.

Faradje, 4 (1 ♂, 2 ♀, adults, 1 subadult ♀), February 25, March 27, July 26, December 5, 1912.

Niangara, 4 (all nurslings), November 16–24, 1910.

Collectors' measurements of 3 adults (1 ♂, 2 ♀) from Faradje:

Cat. No.	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
52049	♂	970	650	320	157	—
52051	♀	920	620	300	140	—
52052	♀	930	630	300	140	73

The four specimens from Niangara (Pl. VII, fig. 1) are all in the first coat, with the milk dentition approaching full development. They have the upperparts nearly uniform dark brown, the fur basally pale buff, darker at the surface, the tips of the longest hairs blackish brown; ears blackish brown externally, especially the apical half, deep buffy internally; tail entirely dull brownish black. Under surface much lighter than the back, pale brown, the tips of the hairs lighter; interramal area brownish black; foreneck pale buff. Limbs externally dark like the sides of the body, pale rufescent internally.

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[1] The total number of localities at which carnivores were collected is 19.
[2] Sixty miles north of Niangara.

Measurements of Four Skulls of *Thos anthus soudanicus*

Cat. No.	Sex	Greatest Length	Condylobasal Length	Basal Length	Palatal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Breadth	Breadth Braincase	Mastoid Breadth	Breadth across p^4–p^4	Upper Tooth-row (c–m^2)	Length p^4
52057	♂[1]	156.5	153.8	148.5	84.2	80.0	26.6	26.7	50.2	48.0	44.9	71.0	13.3
52049	♂	149.0	145.5	137.5	78.0	77.7	24.0	29.8	49.4	48.3	46.5	63.1	12.8
52051	♀	136.6	134.2	127.3	70.0	63.2	19.2	24.8	47.8	45.7	40.5	60.3	12.4
52052	♀[2]	—	—	—	77.4	—	23.4	—	—	46.0	43.0	64.7	12.7

The adults agree well in coloration and dimensions with *T. anthus soudanicus* (Thomas), and geographical considerations favor their provisional reference to this form.

Hollister records[3] five forms of the genus *Thos* from British East Africa as represented in the collection of the United States National Museum. These five forms are referred to three species, as follows:

(1) *Thos adustus bweha* Heller, 6 specimens.
(2) *Thos adustus notatus* Heller, 4 specimens.
(3) *Thos aureus bea* Heller, 10 specimens.
(4) *Thos mesomelas elgonæ* Heller, 9 specimens.
(5) *Thos mesomelas mcmillani* Heller, 37 specimens.

His tabulated measurements of skulls are based on sixty-six adults, in all but ten of which the basal suture is closed; twenty-four are males, thirty-five are females, and of seven the sex is not indicated. As Hollister's tabulations are not summarized and the five forms seem to differ little in size, although representing three specific groups and five forms, it seemed worth while to compute the averages for four of the cranial measurements (condylobasal length, zygomatic breadth, mastoid breadth, and breadth at base of canines) as these form a fair comparative basis for general size. The results being of some interest are presented in the subjoined table. So far as these four cranial measurements are concerned, the two subspecies of *Thos adustus* are not distinguishable by size, the individual variation many times exceeding the slight average difference. The same is true for *Thos aureus bea* and the two forms of *mesomelas*, as regards the condylobasal length, but they differ decidedly in respect to the breadth of the skull, the two forms of *mesomelas* agreeing well with each other and differing decidedly in this respect from *T. aureus bea*, in which, while the condylobasal length is less than in the *adustus* group, the zygomatic and mastoid breadths are practically in agreement. On the other hand, the rostral breadth is less. It would thus seem that the proportional differences of length to breadth may be of diagnostic importance.

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[1] Bafuka, senile male.
[2] Very old; skull badly broken.
[3] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 101–103.

The large series of *Thos mesomelas mcmillani* affords interesting evidence of the amount of sexual difference in the *Thos* group. In this form the average condylobasal length is quite appreciably less in the female (about 4.5 to 5 mm.) than in the male, but is far from definitive, since the larger females frequently exceed the smaller males in skulls of equal age.

Summary of Hollister's Measurements of Sixty-four Skulls of Five Subspecies of the Genus *Thos*

	No. of Spec.	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Breadth at Base of Canines
Thos adustus bweha	6	149.0(142-155)	80.0(71-85)	50.0(49-53)	26.3(24.4-27.6)
" " *notatus*	4	148.5(141-156)	78.0(72-81)	49.3(47-51)	26.4(24.5-27.8)
Thos aureus bea	10	142.4(139-147)	78.6(75-80)	49.2(47-51)	24.8(23.9-26.0)
Thos mesomelas elgonæ	9	142.0(136-144)	84.8(82-90)	51.1(50-53)	23.9(22.9-26.1)
" " *mcmillani*	35	142.0(134-153)	81.0(74-89)	51.0(41-55)	24.8(22.6-26.7)
" " "	14 ♂	144.4(139-153)	84.9(80-89)	54.3(51-55)	25.8(24.4-26.7)
" " "	21 ♀	140.0(134-149)	80.9(77-86)	47.4(49-54)	24.5(22.6-25.9)

MUSTELIDÆ

Mustelinæ

The subfamily Mustelinæ is represented by only three specimens, referable to *Mellivora capensis cottoni* Lydekker. One is merely a flat skin, native-made and without skull, from Vankerckhovenville; the other two are skins with skulls (one of them with a complete skeleton), from Niapu.

MELLIVORA Storr

Mellivora STORR, 1780, 'Prod. Meth. Mamm.,' tab. A. Type by monotypy, *Viverra ratel* Sparrman = *Viverra capensis* Schreber, 1776, 'Säugthiere,' Pl. cxxv, text, 1777 III, p. 450. Original description and figure. "Vorgebirge der guten Hofnung."

Mellivora capensis cottoni Lydekker

Plate VII, Figure 2

Mellivora cottoni Lydekker, 1906, Proc. Zoöl. Soc. London, I, June 7, p. 112, Pl. VII (animal). Type locality, "eastern fringe of the Ituri Forest," near Mawambi. Melanistic.

Represented by 3 specimens, collected as follows:

Vankerckhovenville, 1 (imperfect, native-made skin without skull), November 1911.

Niapu, 2 (both old females; skins and skulls, skeleton of one of them), November 9, December 9, 1913.

Only one of the specimens, a senile female (Pl. VII, fig. 2), has field measurements, which are as follows: Total length, 870 mm.; head and body, 670; tail vertebræ, 200; hind foot, 120.

Two skulls (No. 51951, senile ♀, and No. 51952, ♀ adult): Upper edge of foramen magnum to front of incisors, 131.0, 131.0; condylobasal length, 133.5, 133.4; basal length, 123.5, 123.1; palatal length, 62.0, 62.5; zygomatic breadth, 73.1, 75.0; least interorbital breadth, 34.5, 36.0; least postorbital constriction, 30.5, 31.7; breadth of braincase, 62.0, 62.3; mastoid breadth, 76.2, 77.0; outside to outside of p^4-p^4, 43.8, 46.2; upper toothrow (c-m), 36.9, 37.2; greatest length of p^4, 12.9 (greatly worn), 14.1; least distance between temporal ridges anteriorly, 10.0, 15.8; do., posteriorly, 17.4, 32.3. Rarely do the skulls of two individuals of a species measure so nearly the same as in the present case; in ten out of fourteen measurements the difference is less than two millimeters. The greater difference across p^4-p^4 is really due to the excessively worn condition of the teeth in the senile specimen. The difference in the distance separating the temporal ridges is obviously due to difference in age.

These three specimens agree closely in coloration, the whitish mantle extending in two of them from between the eyes to a little behind the shoulders, fading gradually posteriorly into the black of the rest of the dorsal surface; in the other the mantle continues slightly further, reaching to about the middle of the back, with many scattered white hairs as far as the loins. In two the extreme tip of the tail is clear white; in the other the tip of the tail is wanting.

On the presumption that the *Mellivora capensis* group, which ranges from South Africa to Abyssinia in the east and westward across the continent to Senegal, is separable into a number of regional forms, for which nearly half a score of names have already been provided, the specimens here recorded are referred to *Mellivora cottoni* of Lydekker, the type locality of which was not only in the Ituri Forest but only about a hundred and sixty miles from where the present examples were taken. The type specimen of *cottoni* was "entirely black," but the describer felt disinclined to consider it as "a mere individual melanism," as "the conditions prevalent in the great Ituri Forest are. . . . just the conditions which are conducive to the development of blackness in a species." Although the present specimens are far from being wholly black, they represent a dark form of the *M. capensis* group. Mr. Lang informs me that the specimens from Niapu were taken in the same kind of forest and general environment one finds in Mawambi, but the one from Vankerckhovenville, which lies in the savannah on the northern edge of the forest, is as dark as the darker specimen from Niapu.

Lutrinæ

The subfamily Lutrinæ is represented by two species, referable respectively to the genera *Lutra* and *Aonyx*. An investigation of the relationship of the African clawless otter to the East Indian small-clawed otter has shown the desirability of separating the two groups generically. The principal external and cranial differences are shown in the accompanying illustrations. This investigation became possible mainly through the loan of specimens of small-clawed otters of the East Indian Islands by the authorities of the United States National Museum.

LUTRA Brisson

Lutra BRISSON, 1762, 'Reg. Anim.,' Ed. 2, pp. 13, 201. Type, by tautonymy, *Mustela lutra* Linnæus. (Cf. Merriam, 1895, Science, N. Ser., I, April 5, p. 376, for fixation of type.)

Hydrogale GRAY, 1865, Proc. Zoöl. Soc. London, p. 131, fig. of skull (p. 132). Type, by monotypy, *Lutra maculicollis* Lichtenstein. Not *Hydrogale* Kaup, 1829, for a genus of Soricidæ.

Lutra maculicollis Lichtenstein

Plates VIII, XI; and Text Figures 1–3, 4A, 5A–A¹

Lutra maculicollis LICHTENSTEIN, 1835, Arch. für Naturg., I, p. 89, Pl. II, fig. 1. "Aus dem Kafferlande."

Represented by 9 specimens, collected as follows:

Faradje, 5 (1 ♂ juvenile, 1 ♀ adult, 1 ♀ juvenile, and 2 native skins without skulls), February 28, March 8, 1911; January 7, June 23, 1913.

Niapu, 3 (2 ♂ adults, 1 ♀ adult), June 2, 1913; February 1, 1914.

Avakubi, 1 (native skin without skull), August 1915.

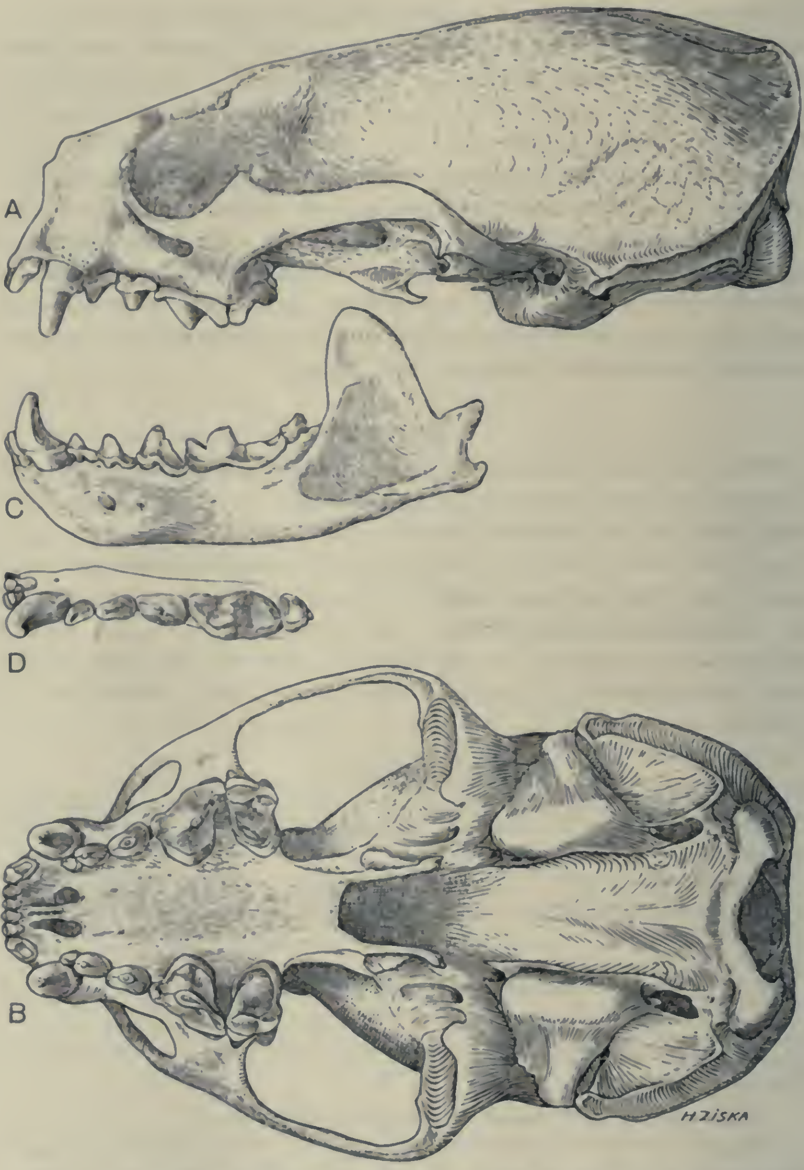

Fig. 1. *Lutra maculicollis.* Skull of adult male (No. 51828). A, lateral view; B, palatal view; C, lateral view of left mandible; D, crown view of left lower dentition. Natural size.

Collectors' Measurements of Four Adults of *Lutra maculicollis*

Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51827	♂	Niapu	1070	625	445	127	18
51828	♂	"	1035	600	435	125	17
51829	♀	"	950	595	355	108	16
51825	♀	Faradje	960	560	400	107	19

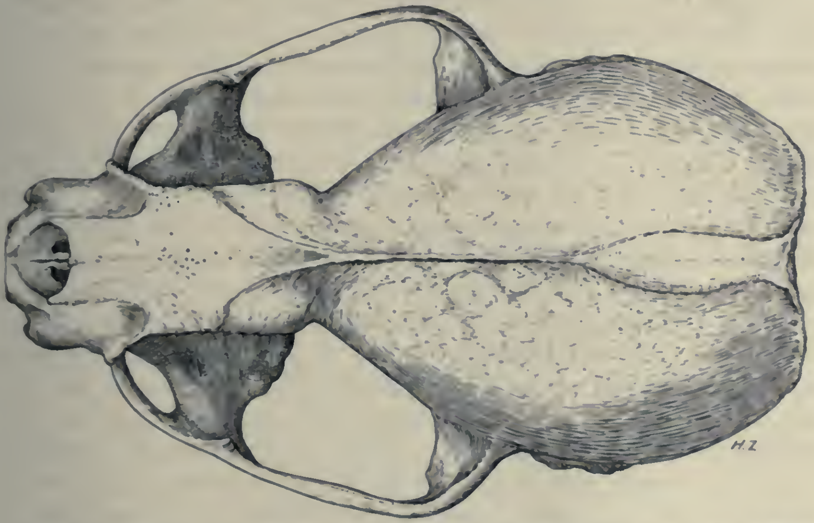

Fig. 2. *Lutra maculicollis.* Dorsal view of skull of adult male (No. 51828). Natural size.

Measurements of Four Adult Skulls of *Lutra maculicollis*

Cat. No.	Sex	Locality	Condylobasal Length	Palatal Length	Zygomatic Breadth	Interorbital Breadth	Breadth Braincase	Breadth at p^4	Breadth at Canines	Incisive Breadth	Upper Tooth-row (c–m^1)
51827	♂	Niapu	105.7	46.4	62.2	15.1	52.2	32.0	24.0	12.2	33.7
51828	♂	"	105.0	44.7	65.0	18.7	52.1	34.0	23.3	12.8	32.3
51829	♀	"	97.2	42.0	——	18.4	47.7	29.0	20.2	10.7	29.2
51825	♀	Faradje	102.5	44.1	55.9	13.8	43.8	28.9	20.2	11.4	31.0

In No. 51825 the teeth are not worn; in the other three skulls the teeth are slightly worn (Figs. 1 and 2).

As shown by the above measurements, the males considerably exceed the females in size.

A young skull (No. 51822, ♂, Faradje) has the full milk dentition (Fig. 3), namely I $\frac{3-3}{1-1}$, C $\frac{1-1}{1-1}$, P $\frac{4-4}{3-3}=\frac{16}{10}=26$. The two inner pairs of upper incisors are slender spicules, deflected outward (laterad); the outer incisors (di^3) are much larger than the middle ones, having a diameter of 0.8 of a millimeter; they are deflected inward (centrad), so as to meet the tip of di^2, the two teeth, as seen from the front, forming a V-shaped arch. In the lower jaw there are only two incisors, the middle pair. They are thread-like, rising about 1 mm. above the jaw, and curve outward (concave laterad), the mid-portion being less separated than either the base or tips. The excluded premolars are dp $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$. By dissection of the gum dp^1 was found beneath the surface, as a small conical tubercle, in the position of p^1 of the permanent dentition. The vestigial dp^1 on the left side was much smaller than the corresponding tooth on the right. They probably would have been absorbed without extrusion. There is no indication of the presence of a dp_1. In the upper jaw the position of both dp^1 and dp^2 is in line with the inner base of dp^3 and dp^4. The milk dentition thus closely resembles that of *Lutra lutra*.

In a somewhat older skull (No. 51826, ♀, Faradje) the upper incisors have been replaced by permanent teeth; the milk canines are still present behind their half-excluded successors; the vestigial dp^1 has been replaced by p^1; dp^2 has been shed and the tip of its successor is slightly above the alveolar plane; dp^3 and dp^4 are still present; the crown of m^1 is fully exposed. In the lower jaw the permanent incisors are fully developed, the permanent canines are about half grown, behind which their predecessors still remain; dp_2 has been shed and the tip of its successor protrudes in its place; dp_3 and dp_4 are still retained; both m_1 and m_2 can be seen through vacuities in the alveolar border.

The present series of nine specimens demonstrates a wide range of variation in color, especially in the white markings of the ventral surface, which vary greatly in extent, position, and outline, no two specimens being very closely similar. Frequently the white markings are nearly restricted to the foreneck and inguinal region, but in some specimens the white area of the foreneck extends forward to include the chin, and posteriorly to include the breast, and often encloses small irregular patches of brown. The white of the inguinal area may be limited to a few spots or form a confluent mass of white and brown markings. Two males from Niapu, both trapped the same night in the same pool, curiously happen to present, respectively, the extremes of variation shown by the

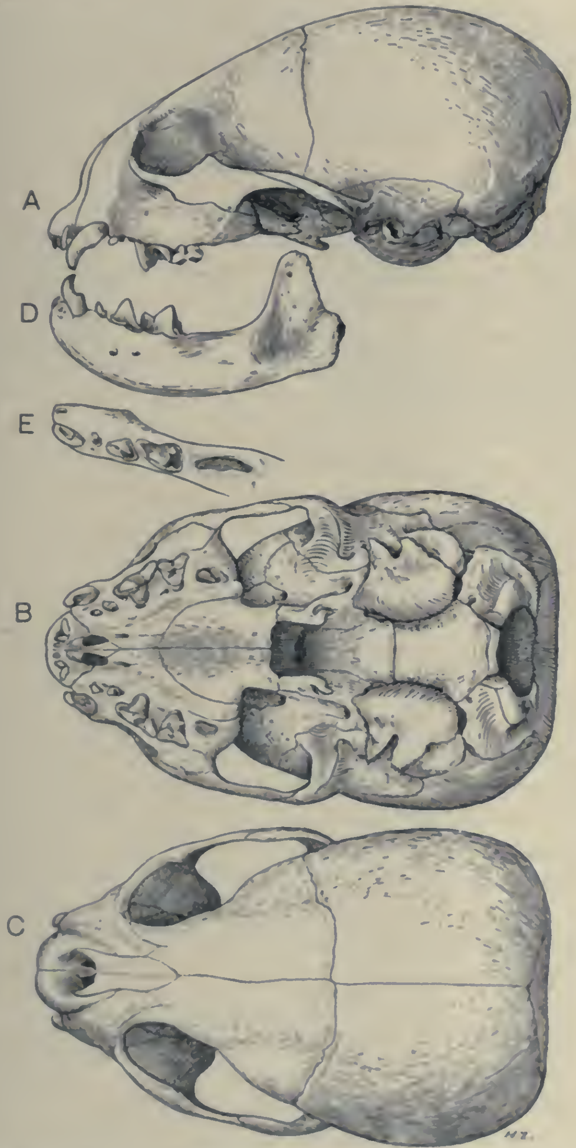

Fig. 3. *Lutra maculicollis.* Skull of juvenile male (No. 51822). A, lateral view; B, palatal view; C, dorsal view; D, lateral view of left mandible; E, crown view of left lower dentition. Natural size.

whole series. One of them has merely a few white streaks and spots on the foreneck and a few small spots of white in the inguinal region. The other has the entire foreneck, from the chin to and including the breast, white, varied with numerous irregular small streaks and spots of brown; the thoracic region is ventrally profusely streaked and spotted with white, while the lower abdominal and inguinal regions are white varied laterally with narrow streaks and isolated spots of brown. The other specimens of the series are variously intermediate (Pl. VIII, figs. 1 and 2).

The general coloration varies decidedly in tone in different specimens of the Faradje series through the varying intensity of the rufescent suffusion, while the three specimens from Niapu agree in presenting a slightly olivaceous tone, quite unlike that of any of the Faradje specimens. This may or may not be due to the different environment of the two localities, Niapu (Pl. XI) being in the rain forest district and Faradje in the bush veldt country. The color of the underfur also varies notably in specimens from the same locality, the basal portion being either clear white, silvery white, or cream-white, or even buff in different specimens, yet the color of the underfur is usually considered of some importance in diagnosis. Apically the underfur is narrowly tipped with dark brown, the amount varying individually.

At the beginning of the present century only two species of otter were recognized by leading authorities[1] as inhabiting Africa south of the Sahara, and both were referred to the genus *Lutra*, as, respectively, *Lutra capensis* Schinz and *Lutra maculicollis* Lichtenstein. Both were described from specimens obtained in Cape Colony. Since 1901, however, three other forms of this group have been described, but two of them are very unsatisfactorily defined. *Lutra concolor* Neumann,[2] from Adis Abeba, Abyssinia, was based on several skins, without skulls or measurements, which are described as being like specimens of *maculicollis* in size and color but lack all trace of white or yellow spots on the chin and throat. The name *Lutra concolor* is in any case preoccupied by *Lutra concolor* Rafinesque (1832) for a species of *Lutra* from "Garrow Hills, Assam, India."[3] *Lutra matschiei* Cabrera,[4] from Muni River, Gaboon, is unrecognizable from the description. *Lutra maculicollis nilotica* Thomas,[5] from the Upper Nile, was based on two skulls and three skins. The measurements given by him of an adult male and an adult female skull (condylobasal length, ♂ 113.5, ♀ 105) indicate a larger form than that of the present Lang-Chapin collection from the Upper Congo, the two adult male skulls from the Congo only equaling the size of the female skull of *nilotica*. It therefore seems preferable, in the absence of comparable material from other localities, to leave the name of the Upper Congo form as above.

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[1] Thomas (1889), Flower and Lydekker (1891), Trouessart (1899).
[2] 1902, Sitzungsb. Ges. Naturf. Freunde Berlin, p. 55.
[3] Rafinesque, 1832, Atlantic Journal, I, No. 2, p. 62
[4] 1903, Bol. Soc. Española Hist. Nat., III, p. 182.
[5] 1911, Ann. Mag. Nat. Hist., (8) VIII, p. 726

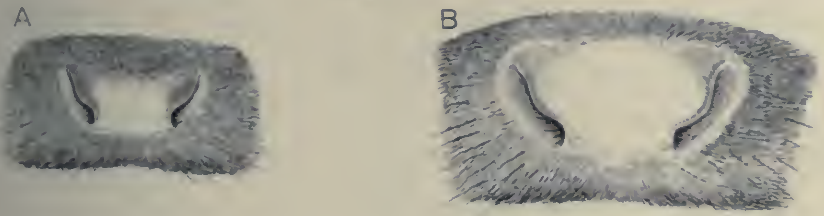

Fig. 4. Rhinarium. A, *Lutra maculicollis* (No. 51828); B, *Aonyx capensis* (No. 51847). Natural size.

Aonyx Lesson

Lutra (part), most authors prior to 1900.

Aonyx Lesson, 1827, 'Man. de Mammalogie,' p. 157. Type, by monotypy, *Aonyx delalandi* Lesson (1827) = *Lutra inunguis* F. Cuvier (1823) = *Lutra capensis* Schinz (1821).

Anahyster Murray, 1860, Proc. Roy. Phys. Soc. Edinburgh, II, p. 157. Type, by monotypy, *Anahyster calabarica* Murray, from Old Calabar. West Africa. Gray, 1865, Proc. Zoöl. Soc. London, p. 129. (As a subgenus of *Aonyx*; restricted to the clawless otters of Africa.)

Aonyx (part) Gray, 1865, Proc. Zoöl. Soc. London, p. 129. (Restricted to the Indian clawless otters.) Thomas, 1908, Ann. Mag. Nat. Hist., (8) I p. 387. (Part; includes both the African and Indian species.)

The genus *Aonyx* Lesson was exclusively based on the so-called clawless otter of the Cape region of South Africa (*Lutra capensis* Schinz, renamed *Aonyx delalandi* by Lesson), of which the genus *Anahyster* Murray, based on a clawless otter from Old Calabar, is a synonym. Notwithstanding the great specialization of its type, *Aonyx* did not receive general recognition as a genus till the present century. G. R. Gray, in 1865 and later, recognized *Aonyx* as a full genus, but he combined with the *Aonyx capensis* group the clawless otters of southern Asia. More than this, he divided *Aonyx*, as he recognized it, into two groups and wrongly assigned his restricted *Aonyx* to the Asiatic species, adopting *Anahyster* for the African species, the only species originally included in *Aonyx*.

Lesson, the founder of *Aonyx*, proposed *Leptonyx* in 1842,[1] for the clawless otters of Asia, a name unfortunately doubly preoccupied, first for a genus of birds (Swainson 1821) and later for a genus of seals (Gray 1837). I hope to show in the present paper that both groups are entitled to full generic acceptance, according to standard modern opinion as to what constitutes generic differences among mammals. *Aonyx*, however, has hitherto stood for both groups, whenever used in either a generic or a subgeneric sense (as, in the latter, by Anderson in 1878[2]).

As of historic interest, and illustrative of the change of viewpoint respecting what characters in mammals should be recognized as of generic value during the last two decades, reference may be made to Thomas' review of the Lutrinæ in 1889[3] and his revised conclusions respecting the same group in 1908.[4] In his earlier paper all the land otters were referred to the genus *Lutra;* in 1908 the genera of land otters conceded as tenable were *Lutra*, *Pteronura* and *Aonyx*. In the first paper he decided that "The skull and dentition of *Aonyx* are wholly those of a true *Lutra*. . . ." In the second paper he says: "Since I wrote my paper on the arrangement of the otters in 1889, opinion has changed as to the value of the characters which should justify generic distinction between different groups, and I am now prepared to admit, with other authors, that the clawless otters (*Aonyx*) and the margined-tailed otter of Brazil (*Pteronura*) should be recognized as generically different from the ordinary otters of the genus *Lutra*. . . .so that their common non-possession of claws is evidently a genuine connecting character, and not a parallelism, as was formerly supposed to be the case." While the foot structure of the clawless otters of Africa and the small-clawed otters of Asia is similar (Figs. 5B-B^1, 5C-C^1), the external and cranial characters, including the dentition, are widely different in the two groups (Pls. IX, X and Figs. 6–9). Yet the clawless Asiatic otters have been, and are still, referred to *Aonyx*, when not placed in *Lutra*, and, with one exception,[5] all the figures that I have seen purporting to give the cranial and dental characters of *Aonyx* have been based on the skulls of Asiatic forms. Hence a non-typical and, from my viewpoint, a non-

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[1] 1842, 'Nouv. Tableau Règne Anim.,' Mamm., p. 72.

[2] Anderson, 1878, 'Anatom. and Zoolog. Researches Yunnan Exped.,' pp. 202 and 213, in reference especially to "*Lutra (Aonyx) leptonyx*."

[3] 1889, 'Preliminary Notes on the Characters and Synonymy of the different Species of Otter.' Proc. Zoöl. Soc. London, pp. 190–200.

[4] 1908, 'On certain African and S. American Otters.' Ann. Mag. Nat. Hist., (8) I, May, pp. 387–395.

[5] Blainville, 1839–1864, in his 'Ostéographie,' Atlas II, Section Mustela, Pl. VIII, figured a skull of *Aonyx (Lutra) inunguis* from South Africa, purchased in 1837 (see the list of plates for Mustela, p. 78 of text). He gives, however, only a view in profile, natural size, which fails to display its most important characteristics.

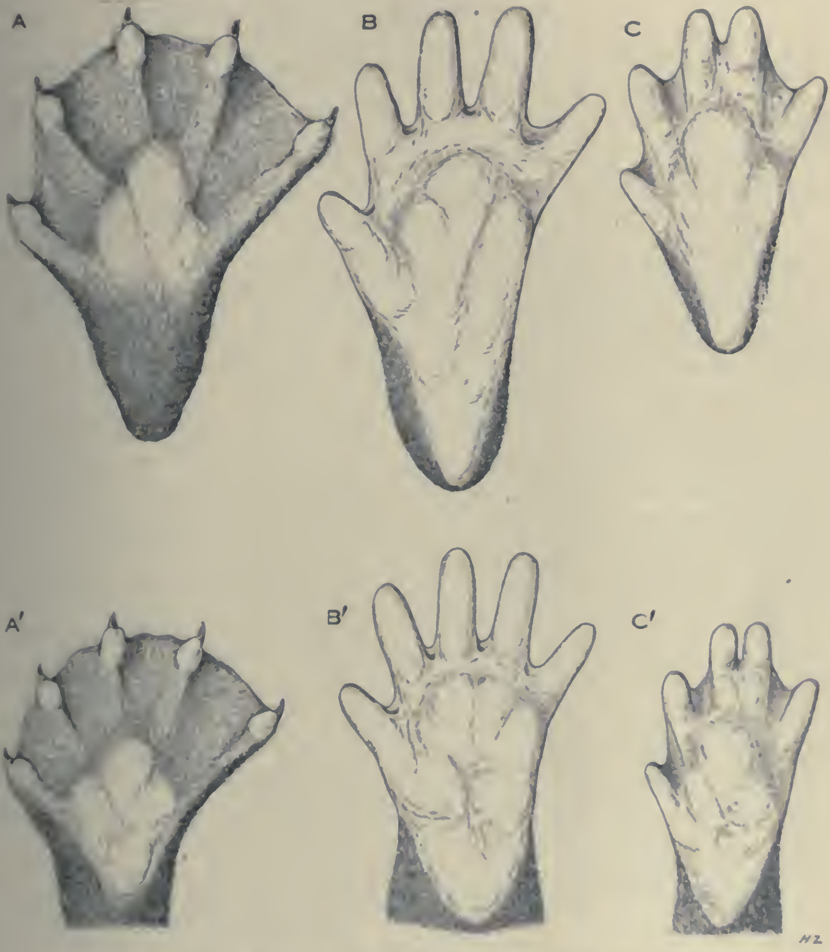

Fig. 5. Palmar surface of left fore foot and plantar surface of left hind foot. A, A′, *Lutra maculicollis* (No. 51825); B, B′, *Aonyx capensis* (Nos. 51849 and 51847); C, C′, *Micraonyx cinerea* (No. 29733). About two-thirds natural size.

congeneric form has been taken to typify *Aonyx*, so far as the literature of the group is concerned.[1]

Externally the *Aonyx capensis* group is distinguishable by its color pattern, its size, and by its foot structure, from all other otters, and especially from the Asiatic forms that have been referred to *Aonyx*.

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[1] See, for example, the well-known figure in Flower and Lydekker's 'Mammals Living and Extinct,' 1891, p. 568, Fig. 261, of the "Palate of *Lutra cinerea*," reproduced from 'Palæontologia Indica.'

Micraonyx J. A. Allen

Plate IX, Figure 1; and Text Figures 5 C-C¹, 6 and 7

Leptonyx (subgenus of *Lutra*) Lesson, 1842, 'Nouv. Tableau Règne Animal,' Mamm., p. 72. Type, by tautonymy, *Lutra leptonyx* Horsfield = *Lutra cinerea* Illiger.

Micraonyx J. A. Allen, 1919, Journal of Mammalogy, I, No. 1, November 28, p. 24. To replace *Leptonyx*, preoccupied.

The name *Leptonyx* is preoccupied by *Leptonyx* Swainson (1821) for a genus of birds, and by *Leptonyx* Gray (1837) for a genus of seals.

The differences between *Aonyx* and *Micraonyx* are quite marked, not only in external features (Pl. IX) but also in the skull and teeth (Figs. 6–9). They are here tabulated for convenient comparison.[1]

External Characters

Aonyx	*Micraonyx*
Size:—Large; total length of adults, 1200–1300 mm. (48–52 inches). Weight, 30 to 40 pounds (Lang).	Small; total length of adults about 560 mm. (22 inches). "Weight, 11 to 13 pounds" (Blanford).
Tail:—Evenly tapering from base to tip, and heavily clothed with long soft hair, even on the apical portion. Length about 60% of length of head and body.	Very broad at base but rapidly decreasing in size to a slender tip; apical two-thirds very short-haired, becoming nearly bare towards the tip, especially on the ventral surface.
Feet:—Upper surface thinly haired in young animals, usually naked or nearly so in adults.	Upper surface well clothed with hairs, as in *Lutra*.
Pads:—Of palmar and plantar surfaces feebly developed, being small and not heavily thickened.	Pads of palmar and plantar surfaces heavily developed, covering the whole of the naked areas and greatly thickened.
Toes:—Slightly webbed at extreme base only (Figs. 5B-B′).	Fully webbed (Figs. 5C-C′).
Claws:—Absent on fore feet, rudimentary on hind feet.	Slightly more developed than in *Aonyx*, but greatly reduced in comparison with those of *Lutra*.
Coloration:—Body uniform dark brown, both above and below, from the shoulders posteriorly, with anteriorly a more or less profuse veiling of white-tipped hairs; foreneck to chin clear white or slightly yellowish white to base of pelage; sides of head and lips white, in continuation of the white area of the throat; a large squarish	Upperparts entirely uniform dark brown, without head-markings or white-tipped hairs; underparts somewhat paler, becoming whitish on sides of neck, cheeks, chin and throat. Ears like the head, without white edging. The coloration in general is thus similar to that of most of the species of *Lutra*.

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[1] The statistics given below in tabular form are based, in the case of *Aonyx*, on averages of six adults for the external measurements, and on twelve adults for the skull and teeth, all from Faradje, Belgian Congo; in the case of *Micraonyx*, for external measurements on five adult specimens as given in the literature, and for the skull and teeth on six adult skulls and two with milk dentition from Java, Borneo, Sumatra, and Palawan, of which seven were received for examination from the United States National Museum through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals.

patch of dark brown between the eyes and nostrils, forming a conspicuous isolated spot in which the hairs are not tipped with white; a V-shaped whitish band from the rhinarium forms fairly well-defined superciliary streaks. Ears conspicuously edged on the apical border with white. There is thus a distinctive head-pattern of markings.

While the external differences are by no means insignificant, those of the skull and teeth are such as most taxonomers consider of high importance. Some of these differences have not escaped record,[1] but this fact has not directed to them the attention they deserve. While at first glance the skulls of *Aonyx* and *Micraonyx* appear to have many features in common, they differ greatly in proportions and in the relative size of corresponding teeth. In *Aonyx* the antorbital portion of the skull is heavily developed, being broad, with large incisors and canines, while the carnassials and molars are only moderately developed in proportion to the size of the skull; all these conditions are reversed in *Micraonyx*. In the latter the facial portion of the skull is narrow and weak, with small incisors and canines, while the carnassials and molars are enormously developed for the size of the skull, these teeth about equaling those of *Aonyx*, which has a skull fully three times the bulk of the skull of *Micraonyx*. This creates a vast difference in the relative breadth of the palatal space between the carnassials and molars of the maxillary series, which in *Micraonyx* is much less than the transverse breadth of m^1, while in *Aonyx* this space is one and a half times greater than the transverse breadth of m^1. These proportional differences are shown in the accompanying figures (Figs. 6 and 8, pp. 96, 102) and in the following tabulated summary.

Cranial Characters

Aonyx	*Micraonyx*
DENTITION:—P^1 uniformly present in 13 out of 14 adult skulls; absent on the right side only in the other.	P^1 nearly always absent, according to authors. P^2 relatively smaller but in about the same position as in *Aonyx*.[2]
SKULL:—Postorbital processes rudimentary.	Postorbital processes well developed, more so than in *Lutra*.

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[1] See Blanford (1888, 'Mamm. of British India,' p. 188), who says: "Although it [*Lutra leptonyx*] does not differ in the same manner [from the common otters] as the type of *Aonyx* does, *L. leptonyx* has several peculiarities of its own not shown by its supposed ally. Its skull is peculiarly short and broad, with a differently shaped upper posterior molar, and its feet differ from those of other species, including *L.* [illegible], in the much greater proportional length of the third and fourth toes."

Of the nine skulls available for examination p^1 is absent on both sides in six, present on the left side only in two, and on both sides (milk dentition) in one.

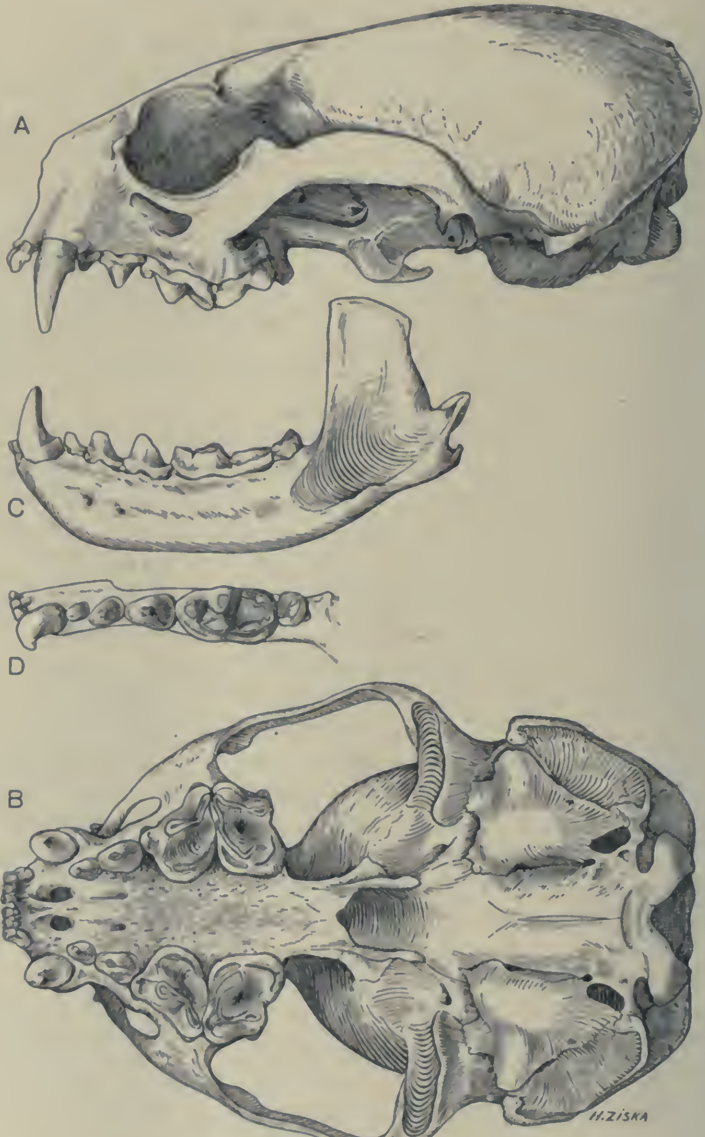

Fig. 6. *Micraonyx cinerea*. Skull of adult female (U. S. Nat. Mus. No. 34904). A, lateral view; B, palatal view; C, lateral view of left mandible; D, crown view of left lower dentition. Natural size.

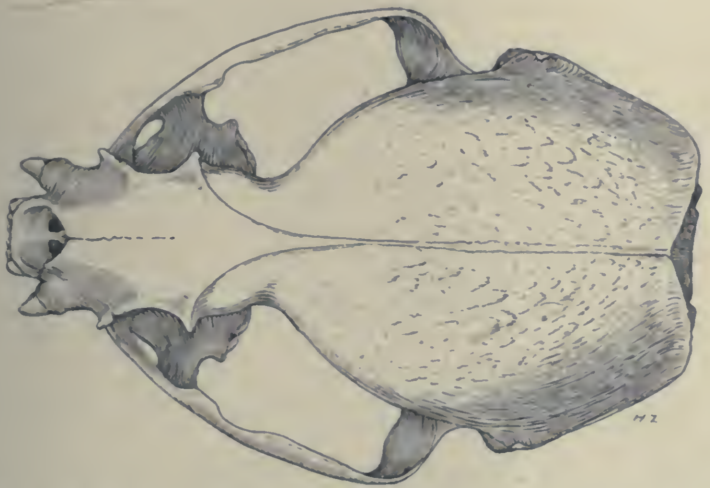

Fig. 7. *Micraonyx cinerea*. Dorsal view of skull of adult female (U. S. Nat. Mus. No. 34904). Natural size.

Aonyx	*Micraonyx*
Postorbital breadth greater than interorbital breadth.	Postorbital breadth less than interorbital breadth, the postorbital constriction as deep as in many species of *Lutra*.

Dental Measurements

Upper Toothrow

c-m^1,	38.8	c-m^1,	32.2
p^1-m^1.	33.0	p^2-m^1,	26.8
p^4,	10.9 × 10.5	p^4,	12.8 × 13.8
m^1,	10.2 × 12.5	m^1,	8.8 × 12.2

Lower Toothrow

c-m_2,	48.5	c-m_2,	37.6
p_1-m_2,	33.5	p_2-m_2,	27.0
m_1,	14.8 × 8.7	m_1,	13.4 × 8.0
m_2,	4.9 × 6.7	m_2,	4.9 × 6.3
Axis of m^1 oblique to the axis of the toothrow.		Axis of m^1 nearly transverse to the axis of the toothrow.	

Skull

	Aonyx	*Micraonyx*	Ratio
Condylobasal Length	124.3	89.2	73
Zygomatic Breadth	91.5	61.7	66
Mastoid Breadth	89.2	53.9	60

Skull (Continued)

	Aonyx	*Micraonyx*	Ratio
Rostral Breadth (at base of upper incisors)	21.5	10.8	50
Breadth at Base of Upper Canines	35.5	21.9	62
Breadth, outside m^1-m^1	41.3	34.2	83
Breadth, outside p^4-p^4	39.3	33.1	84
Interorbital Breadth	30.0	18.0	60
Postorbital Constriction	34.6	15.6	45
Palatal Breadth between Crowns of m^1 and m^1 (1.6 the transverse breadth of m^1).	20.0	11.2	(slightly less than the transverse breadth of m^1).

Summary of Differentiation of *Micraonyx* in Comparison with *Aonyx*.—One-third the size (bulk) of *Aonyx;* reduction of preorbital portion of skull and its general structure relatively weak, or more like that of *Lutra*, with at the same time enormous development of the carnassials and molars, which are about equal in size to those of *Aonyx*, which has a skull fully three times larger; palatal space between upper molars slightly less than breadth of one molar, in *Aonyx* almost the breadth of both molars; m^1 relatively broader, with the transverse axis of the tooth forming a right angle with the toothrow, while in *Aonyx* the transverse axis of m^1 forms an angle of about 45° with the axis of the toothrow; p^1 usually suppressed in *Micraonyx* and constantly present in *Aonyx;* tail broad at base, soon narrowing and gradually tapering to a point, the apical portion scantily furred, instead of gradually decreasing in size apically and heavily furred throughout, as in *Aonyx*, in which the tail is similar to the tail of the European and North American species of *Lutra*. In *Micraonyx* the tail is specialized quite as much as in *Pteronura*, but in a quite different way. Coloration wholly as in *Lutra*, highly specialized in *Aonyx*.

Specimens of *Micraonyx* Examined

The available material consists of three skins and nine skulls, three of the latter immature, with part of the milk dentition still present. Three of the eleven specimens examined are in the collection of The American Museum of Natural History; the others (all skulls) were borrowed from the United States National Museum, through the courtesy of the Curator of Mammals, Mr. Gerrit S. Miller, Jr.

No. 29733, ♂? adult, skin and skull, Palawan Island, Philippine Islands; also two skins (without skulls) from the same source.

No. 122840, ♂ adult, Karimon Island, Malacca Strait, May 28, 1903. Coll. Dr. W. L. Abbott.

No. 114465, ♀ adult, Tapanuli Bay, West Sumatra, March 27, 1902. Coll. Dr. W. L. Abbott.

No. 123068, ♂ juvenile (upper milk canines, dp^1, and dp_3 are still retained), Pulo Sebang, East Sumatra, July 31, 1903. Coll. Dr. W. L. Abbott.

No. 34904, ♀ adult, Kinabatangan River, Borneo, June 20, 1887. Coll. C. F. Adams.

No. 151879, ♀ adult, Pulo Laut, Southeast Borneo, December 26, 1907. Dr. W. L. Abbott.

No. 155324, ♂ adult, Depok, Java, July 22, 1909. Coll. William Palmer.

No. 154905, ♂ juvenile (upper milk canines, dp^2, dp^3, dp^4 and dp_3 are still retained), Buitenzorg, Java, March 21, 1909. Coll. William Palmer.

No. 154906, ♂ juvenile (milk dentition only), Buitenzorg, Java, March 26, 1909. Coll. William Palmer.

Three of the specimens (only one of which is adult) may be considered as practically topotypical of *Lutra leptonyx* Horsfield (= *L. cinerea* Illiger).

The localities of the six adult skulls are widely separated, there being one each from Palawan Island (Philippines), Karimon Island (Strait of Malacca), western Sumatra, eastern Sumatra, from two different parts of Borneo, and from eastern Java. They are thus insufficient to indicate any geographic differentiation, should such exist, as the range of variation seems no greater than might be expected in a large series from a single locality. The subjoined table indicates their strong general similarity.

Measurements of Six Adult Skulls of *Micraonyx cinerea* (Illiger)

Cat. No.[1]	Sex	Locality	Condylobasal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Constriction	Breadth Braincase	Mastoid Breadth	Postorbital Process	Breadth at Base of Incis.	Breadth Base of Canines
29733	♂?	Palawan	—	63.6	17.5	13.4	—	—	20.0	20.1	33.4
122840	♂	Malacca St.	91.4	61.2	19.7	13.6	48.8	54.4	29.0	24.3	37.1
114465	♀	W. Sumatra	88.7	61.7	17.0	14.4	48.0	54.9	25.6	21.7	32.0
34904	♀	N. E. Borneo	90.3	62.1	18.0	15.8	48.3	53.4	24.4	21.4	33.4
151879	♀	S. E. Borneo	84.6	58.6	17.2	16.4	43.7	52.0	24.1	20.8	34.5
155324	♂	E. Java	90.8	62.8	18.4	**14.7**	48.8	54.7	25.1	22.8	34.8
Average			**89.2**	**61.7**	**18.0**	—	**47.5**	**53.9**	**24.7**	**21.9**	**34.2**

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[1] All U. S. Nat. Mus. except No. 29733.

Measurements of the Teeth of *Micraonyx cinerea* (same skulls)

Cat. No.	Sex	Upper Toothrow c-m^1	Lower Toothrow c-m^2	Length P^4 Breadth	Length M^1 Breadth	Length M$_1$ Breadth	Length M$_2$ Breadth
29733	♂?	32.0	37.0	10.7×11.3	9.0×11,2	13.0×7.9	4.6×6.3
122840	♂	31.3	40.2	12.8×13.8	9.5×13.5	15.0×8.8	5.7×7.2
114465	♀	29.4	34.7	9.2× 9.2	7.8×11.7	11.1×6.8	4.1×4.9
34904	♀	32.7	37.6	11.2× 8.8	8.6×12.5	13.0×7.6	4.4×5.8
151879	♀	31.5	37.5	11.0×10.0	8.5×12.0	13.4×7.9	4.6×6.2
155324	♂	33.3	37.6	11.1×11.5	8.4×11.8	12.7×7.6	5.0×6.3
Average[1]		**32.2**	**37.6**	**11.4×11.1**	**8.8×12.2**	**13.4×8.0**	**4.9×6.6**

Aonyx capensis (Schinz)

Plates IX, Figures 2, 3; X; XI; and Text Figures 4B, 5B-B′, 8–11

Lutra capensis Schinz, 1821, 'Cuv. Thierreich,' I, p. 214. Cape region, South Africa.

Represented by 23 specimens, collected as follows:

Faradje, 21 (15 skins with skulls, 2 with skeletons, and 6 native-made skins without skulls), January 20, 22, 1910; February 25, 28, March 1–16, April 6, May 5, 1911; August 12, 13, 1912; January 28, February 2, 7, 1913.

Niapu, 1 (skin and skull, old ♀), January 15, 1914.

Avakubi, 1 (native-made skin without skull), August 14, 1914.

Collectors' Measurements of Nine Specimens of *Aonyx capensis*

Cat. No.	Sex and Age	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51840	♂ yg. ad.	Faradje	1035	625	410	146	35
51846	♂ ad.	"	1356	796	560	150	35
51847	♂ yg. ad.	"	1090	655	445	146	34
51836	♀ ad.	Faradje	1170	770	400	140	35
51834	♀ ad.	"	1196	736	460	135	35
51837	♀ yg. ad.	"	1090	700	390	135	31
51838	♀ ad.	"	1155	715	440	132	32
51853	♀ old ad.	"	1360	830	530	145	35
51851	♀ ad.	Niapu	1225	720	505	145	32

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[1] Five specimens, No. 114465 being excluded on account of extreme wear.

Measurements of Thirteen Skulls of *Aonyx capensis*
(All are from Faradje except No. 51851, which is from Niapu)

Cat. No.	Sex and Age	Condylobasal Length	Palatal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Constriction	Breadth Braincase	Mastoid Breadth	Breadth across p^4-p^4	Upper Toothrow	
										P^1-m^1	C-m^1
51835	♂ juv.[1]	112.5	51.8	72.8	26.4	34.0	70.0	76.7	37.2	31.6	36.2
51840	♂ yg. ad.	121.0	58.0	82.7	28.4	37.0	73.0	82.2	38.7	33.1	39.7
51845	♂ old ad.	130.4	58.4	98.0	28.4	32.2	70.7	94.0	38.8	33.6	39.5
51846	♂ old ad.	124.4	58.3	99.7	33.3	34.4	70.6	87.5	41.0	33.7	37.9
51847	♂ yg. ad.	125.0	62.0	89.5	29.7	33.4	72.6	91.5	39.3	33.4	38.8
51836	♀ old ad.	125.7	60.0	94.0	28.4	32.6	70.8	84.0	40.2	33.5	39.2
51834	♀ ad.	116.8	54.0	88.3	30.5	37.8	69.9	86.8	37.9	31.3	36.7
51837	♀ ad.	120.0	54.5	84.6	27.0	——	70.3	86.9	39.2	32.9	38.8
51838	♀ ad.	136.7	63.2	93.1	30.5	33.5	73.8	92.6	——	35.3	40.2
51849	♀ yg. ad.	110.0	53.6	81.2	29.4	34.4	69.3	82.7	39.6	31.3	36.3
51850	♀ yg. ad.	108.5	54.0	75.9	26.7	——	70.6	76.5	37.7	30.3	37.0
51851	♀ old ad.	——	——	89.5	——	——	71.2	90.8	——	32.3	38.4
51853	♀ old ad.	129.7	62.2	95.8	33.5	36.4	69.5	90.0	40.2	32.2	38.8
Average[2]	**4 ♂**	**125.2**	**59.0**	**92.2**	**30.0**	**34.3**	**71.7**	**89.3**	**39.4**	**33.4**	**39.0**
"	**6 ♀**	**123.4**	**58.8**	**90.9**	**30.0**	**34.9**	**70.9**	**89.0**	**39.1**	**32.9**	**38.7**

Measurements[3] of the Two Posterior Teeth of Each Jaw of *Aonyx capensis* (Same specimens as in the preceding table)

Cat. No.	Sex	P^4 Length Breadth	M^1 Length Breadth	M_1 Length Breadth	M_2 Length Breadth
51835	♂	12.1×10.2	11.0×12.5	15.2×8.8	5.1×6.3
51840	♂	11.2×11.4	9.2×13.5	14.8×9.2	4.9×7.5
51845	♂	11.4×11.9	10.5×13.8	15.4×9.0	5.1×7.1
51846	♂	10.9×11.7	10.0×14.0	15.4×8.5	5.5×7.1
51847	♂	9.9×11.7	10.9×13.1	14.8×9.7	5.4×6.6
51836	♀	10.6×11.4	10.1×11.1	15.1×8.1	4.1×5.6
51834	♀	10.4× 9.2	11.0×13.8	13.8×7.8	4.3×6.4
51837	♀	10.8× 8.9	9.2×14.0	14.2×8.4	4.9×6.0
51838	♀	10.9× 9.8	11.2×10.5	15.4×9.5	4.7×6.3
51849	♀	11.9×10.0	9.9× 8.6	13.8×8.0	4.3×5.4
51850	♀	9.8× 9.2	9.2×12.2	15.4×8.9	4.8×7.2
51851	♀	11.5×——	9.8×11.6	14.5×8.4	4.4×6.2
51853	♀	10.7× 9.7	9.4×13.2	14.7×8.1	5.1×6.2
Average	**5 ♂**	**11.1×11.4**	**10.3×13.2**	**15.1×9.0**	**5.2×6.9**
"	**8 ♀**	**10.8× 9.7**	**10.0×11.9**	**14.6×8.4**	**4.6×6.4**

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[1] In No. 51835 the canines are not fully developed and all the cranial sutures are still open. While the condylobasal length is recorded in the above table, the basal length was also taken for comparison, since "basal" was formerly taken instead of "condylobasal." The average difference was found to be about 12 mm. less for the basal length than for the condylobasal.

[2] These four males and six females are fairly comparable as to age, but not strictly so, the females apparently averaging slightly younger than the males.

[3] Length = greatest axial length of the tooth; breadth = greatest breadth transverse or at a right angle to the axial length.

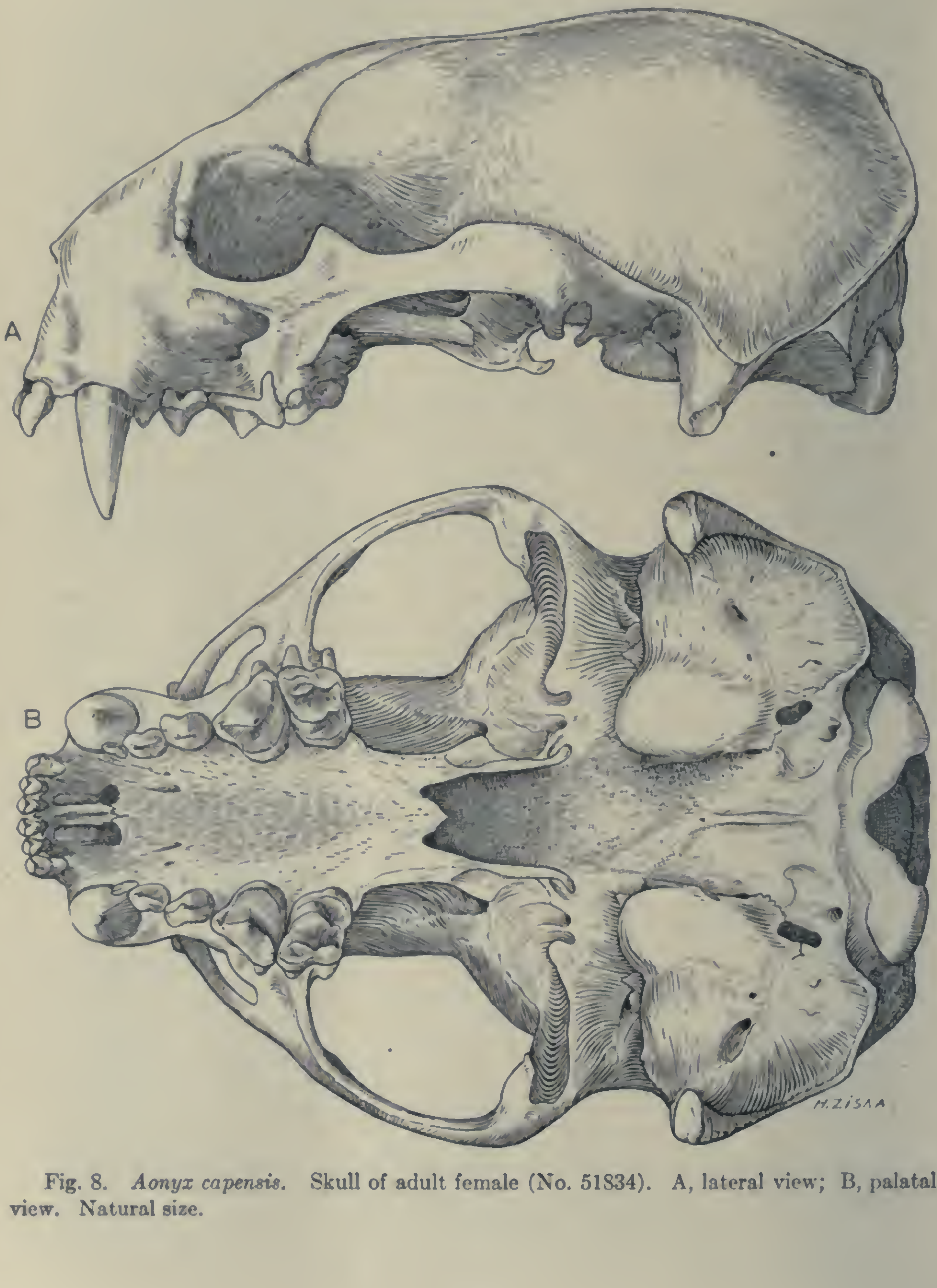

Fig. 8. *Aonyx capensis.* Skull of adult female (No. 51834). A, lateral view; B, palatal view. Natural size.

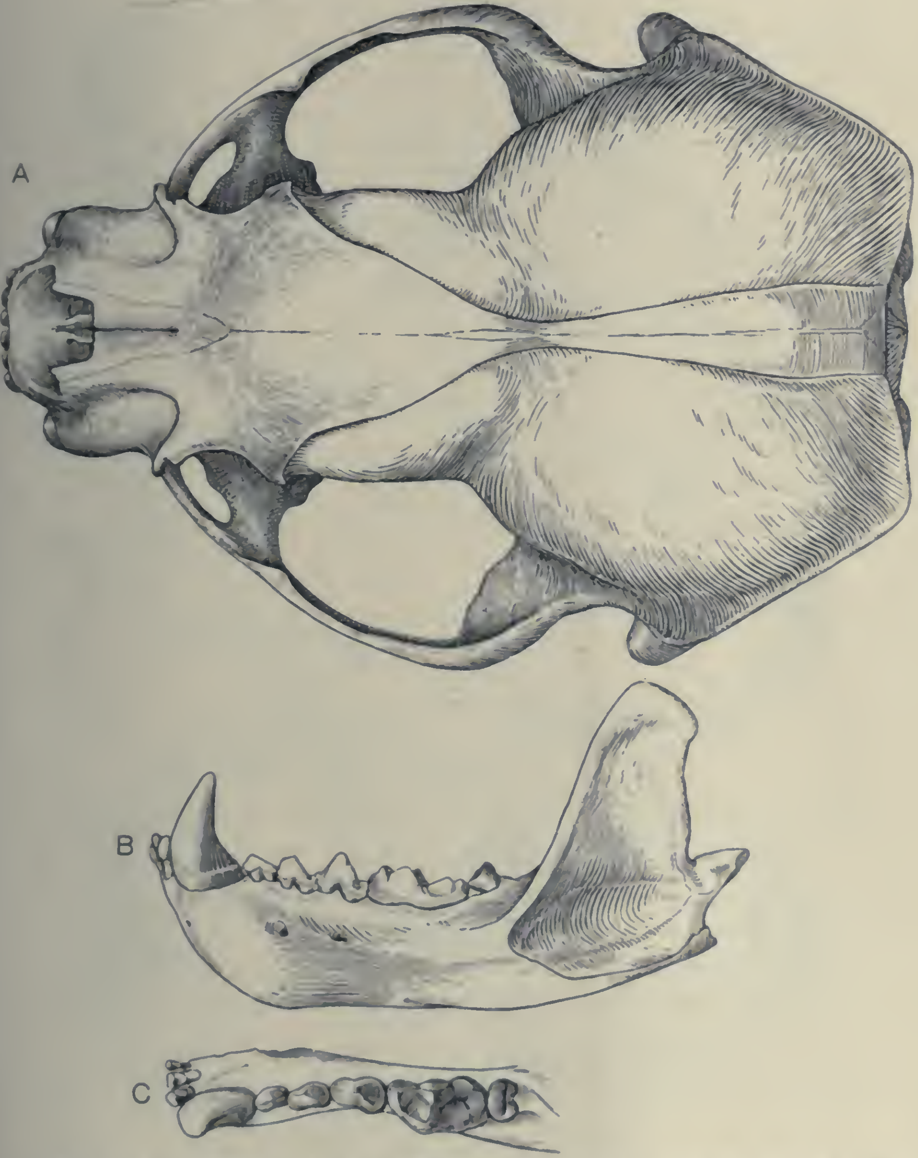

Fig. 9. *Aonyx capensis.* Skull of adult female (No. 51834). A, dorsal view; B, lateral view of left mandible; C, crown view of left lower dentition. Natural size.

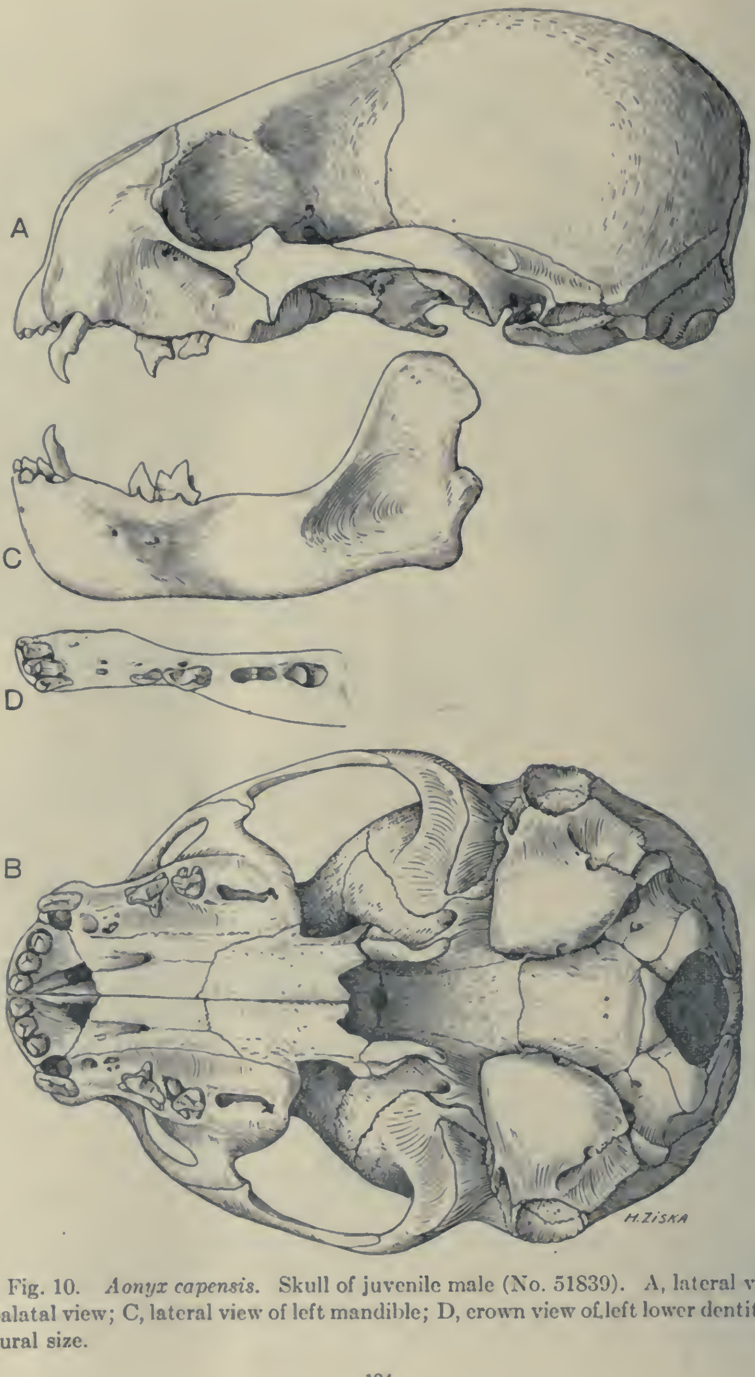

Fig. 10. *Aonyx capensis.* Skull of juvenile male (No. 51839). A, lateral view; B, palatal view; C, lateral view of left mandible; D, crown view of left lower dentition. Natural size.

As shown in the above tables of measurements, there is no appreciable sexual difference in size between males and females of comparable ages of *Aonyx capensis*. In both sexes there is a marked difference in size, due to age, between young adults with unworn teeth and old adults with strongly developed crests and worn teeth. The interorbital breadth varies greatly with age, as is of course usual in mammals, particularly in comparison with the breadth of the interorbital constriction, which latter decreases with age, while the interorbital breadth increases. With increase in age the bones of the skull become thickened and roughened and the crests and processes more heavily developed, but in the present species these changes have no relation to sex, as shown by the present series.

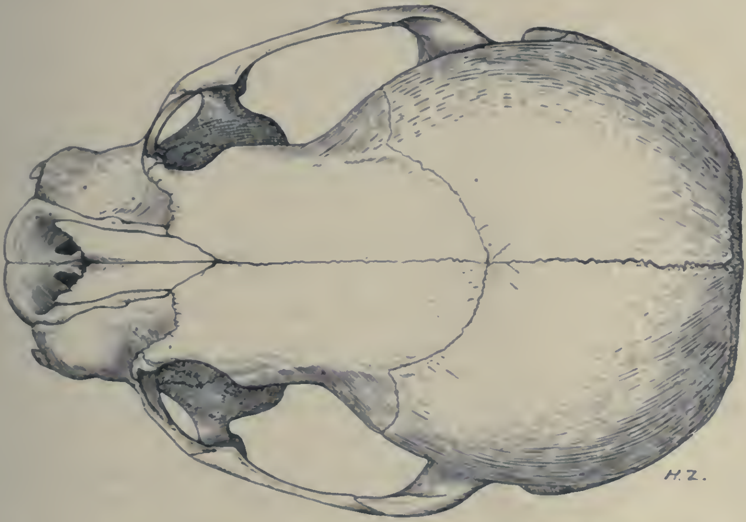

Fig. 11. *Aonyx capensis*. Dorsal view of skull of juvenile male (No. 51839). Natural size.

A female (No. 51831, Faradje) is noteworthy for the presence of a supernumerary upper premolar, situated on the left side and internal to the toothrow opposite the front half of p^3. It is similar in form to p^2 but is slightly smaller than this tooth.

Two skulls still retain part of the milk dentition. In the younger (No. 51839, ♂) all the milk teeth have been shed except the canines and dp^3 and dp^4 (Fig. 10). The tips of the permanent incisors are exposed but rise only slightly above the alveoli; the tips of the canines are uncovered but are still below the alveolar plane; m^1 can be seen through slight openings in the crown surface of the alveolus. In the other (No. 51848, ♂), a week or two older, only the deciduous canines and p^3 remain of the milk set. The permanent incisors have reached full development, the tips of the permanent canines and of p^2 and p_2 are well above the alveolar border; the crown surfaces of p^4, m^1, m_1 and m_2, are fully exposed. In this skull there is no evidence of p_1 in either jaw. It is of interest to note that in both of these young skulls the lower incisors are crowded, the second pair (i_2-i_2) have their insertion in a line posterior to that of the other four incisors and, slanting forward, wedge their crowns between those of the other incisors, approximating thus a straight crown surface. The lower incisors of *Aonyx* at this early stage of growth are in agreement in their mode of insertion with those of *Lutra*. With the expansion of the mandible by growth, the lower incisors arrange themselves, of course, in a straighter row, and in some are well spaced, each standing apart from the adjoining teeth (Fig. 9C, p. 103), while others retain the crowded feature.

The table of tooth measurements (p. 101) indicates the range of individual variation in the size and contour of the crowns of the last two permanent teeth in each jaw. It not only makes evident the amount of difference in these features that so readily attracts the eye, but also the fact that the largest skulls (see table of measurements of the skulls, p. 101) do not always have the largest teeth. (Compare skull and tooth dimensions of skulls Nos. 51835, 51845 among the males and Nos. 51837, 51853 among the females.) The amount of variation in length and breadth of crown, taking the series of skulls as a whole, is about 10% of the average dimensions.

The average coloration in the present series may be indicated as follows: Upper lips, top of the nose back to about the front of the eyes, and a narrow band over each eye to between the ears, white or yellowish white; a large squarish spot of dark brown on either side from nostril to eye; also a small spot of dark brown at the posterior canthus of each eye; top of head, neck, and shoulders whitish grizzled with brown, white prevailing in the unworn coat, the overhair being glistening white for the apical half, through which the brownish tips of the underfur are more or less visible; the white tips of the overhair gradually decrease in length from the middle of the back posteriorly so that brown is the prevailing tone, to which the whitish tips add a silvery glint in favorable light; upper lip, below the preorbital brown patch, white or yellowish white, as are the sides of the head below the eyes, the chin, throat, foreneck and sides of the neck posteriorly to the pectoral region, the white extending to the base of the pelage, including the underfur; rest of underparts brown like the upperparts, with a less conspicuous mixture of white-tipped hairs; ears conspicuously edged with white on the apical border; tail and feet brown, like the lower back.

The chief variation in different individuals consists in the relative length, and hence conspicuousness, of the white hair-tips, which are longest in the freshly acquired coat, although they vary considerably in perfectly comparable specimens, being normally short in some and long in others. In most specimens the whitish sheen of the anterior half of the body is a striking feature when seen from the front with the head toward the light. The amount of white on the throat is more variable in extent and also in intensity. In one specimen the white on the throat and foreneck is restricted to the middle of the throat, but extends somewhat farther back on the sides of the neck; the white is also confined to the outer portion of the hairs, the basal half of the pelage being pale brown and not white as in most of the other specimens of the series, so that when seen with the head from the light the middle of the throat area appears pale brown with a whitish wash.

In several specimens there is a tendency to a dusky cross-band behind the chin, strongly developed in one specimen and incipient in others. In several specimens in greatly worn pelage the overhair is so much abraded that only the underfur remains over a wide space along the midline of the back, and elsewhere the usual white tipping of the overhairs has nearly disappeared. The pattern of the head-markings is constant, being modified only by the amount of white veiling the upper surface of the front and top of the head. The rhinarium is shown in Fig. 4B.

The African clawless otter was first described by Schinz in 1821 as *Lutra capensis*,[1] from a specimen obtained in Cape Colony. It was redescribed by F. Cuvier in 1823 as *Lutra inunguis*[2] from a skin and skeleton sent by Delaland from the Cape of Good Hope. In 1827 the species was generically separated by Lesson and renamed *Aonyx delalandi*.[3] Thus between 1820 and 1830 the species had received three specific names and had been referred to two genera. Notwithstanding its striking differences from the common otter of Europe, the type of the genus *Lutra*, it was currently referred by most authors for the next three-fourths of a century to the genus *Lutra*.

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[1] 1821, 'Cuv. Thierreich,' I, p. 214.
[2] 1823, 'Dict. Sci. Nat.,' XXVII, p. 247.
[3] 1827, 'Man. de Mammalogie,' p. 157.

Besides the well-known early synonyms of *Aonyx capensis* (*inunguis* F. Cuvier, *delalandi* Lesson) and three practically indeterminable later described forms (*poensis* Waterhouse 1838, *calabaricus* Murray 1860, *lenoiri* Rochebrune 1888),[1] five others have been added since 1901. These are (1) *Lutra capensis meneleki* Thomas (1902),[2] from Abyssinia, characterized mainly by large size (skull, basal length 131 mm., zygomatic breadth 106 mm.), dark color and silvery underfur; (2) *Lutra capensis hindei* Thomas (1905)[3] from Fort Hall, Mount Kenya District, British East Africa, of small size (skull, basal length 118 mm., zygomatic breadth 94 mm.) but otherwise similar to the Cape and Abyssinia forms; (3) *Aonyx capensis angolæ* Thomas (1908),[4] from Coporole River, Angola (S. lat. 13°), without any strongly marked characters (skull, basal length 128 mm., zygomatic breadth 91.5 mm.); (4) *Aonyx capensis congica* Lönnberg (1910),[5] from the "Lower Congo," supposed to be especially distinguished by the small size of the teeth; (5) *Aonyx capensis helios* Heller (1913),[6] from the Sotik District, British East Africa, said to resemble closely *meneleki* of Abyssinia in coloration (skull, condylobasal length 127 mm., zygomatic breadth, 91 mm.), but body supposed to be smaller (as judged by the measurements of a tanned skin).

As these five forms appear to have been described in each case from a single specimen, without flesh measurements and in some instances from poorly prepared material, none of them can be said to rest on a very satisfactory basis. The differences in coloration indicated by the descriptions of these forms are more than covered by the range of variation in the present Lang-Chapin series of some twenty specimens from a single locality (Faradje), while the individual difference in size is more than covered by the twelve adults. The status of these various forms should be held more or less in abeyance until a good series from each type locality has been studied and compared. Under such circumstances, it seems better not to add another name to the list till the forms already described are better known, notwithstanding the known wide distribution of the *Aonyx capensis* group—from the Cape region of South Africa north to Abyssinia, the Congo Basin, and Guinea.

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[1] *Lutra poensis* was based on a skin without feet, from Fernando Po, which Gray stated in 1865 (Proc. Zoöl. Soc. London, p. 130) "is no longer to be found." Lönnberg, in 1910 (Arkiv f. Zool., VII, No. 9, p. 2), believed it to be referable to *Lutra maculicollis* rather than to *Aonyx*. He also stated (*loc. cit.*), on the authority of Trouessart, that there was no specimen of Rochebrune's *Lutra lenoiri* "in the museum in Paris and that the species in question must be regarded as purely imaginary." *Anahyster calabaricus*, Lönnberg also stated (*loc. cit.*), was based on a skull in which p^1 was abnormally absent, and must also be rejected.

[2] 1902, Proc. Zoöl Soc. London, II, p. 309.

[3] 1905, Ann. Mag. Nat. Hist., (7) XV, p. 78.

[4] 1908, Ann. Mag. Nat. Hist., (8) I, p. 388.

[5] 1910, Arkiv för Zoologi, VII, No 9, December, p. 3, figs. 1*a* and 2*a*.

[6] 1913, Smithsonian Misc. Coll., LXI, No. 19, November, p. 1.

VIVERRIDÆ

The family Viverridæ is here recognized as comprising two strongly differentiated subfamilies, Viverrinæ and Herpestinæ, which by some taxonomers are now given the rank of distinct families.[1]

Viverrinæ

The Viverrinæ are represented in the present Congo collection by five genera (*Civettictis*, *Genetta*, *Osbornictis*, *Poiana*, and *Nandinia*) and eight species. An interesting feature of the collection is a new piscivorous form of genet (*Osbornictis piscivora* J. A. Allen), of the size of *Genetta victoriæ* Thomas, from which however it differs widely in both external and cranial characters. The total number of specimens is 242, five of the species being represented by from 30 to 73 specimens each. Several of the species are each represented by from 20 to 30 specimens from single localities, thus affording satisfactory material for the study of age, sex, and individual variation.

CIVETTICTIS Pocock

Viverra LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 43, part, and of authors prior to 1915. Type, by subsequent designation (Thomas 1911), *Viverra zibetha* Linnæus, of Bengal, India.

Civettictis POCOCK, 1915, Proc. Zoöl. Soc. London, I, March, p. 134. Type, by original designation, *Viverra civetta* Schreber.

Civettictis civetta orientalis (Matschie)

Plates XII, XIII; and Text Figures 12–15

Viverra civetta orientalis MATSCHIE, 1891, Arch. für Naturg., Bd. 1, pp. 352, 353. Bagamojo, Zanzibar.

Civettictis civetta THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 471. Medje (1), Poko (6 specimens).

Represented by 32 specimens (of which only 9 are fully adult), collected as follows:

Faradje, 1 (♂, flat skin, without skull or measurements), August 22, 1912.

Niangara, 2 (♀ juvenile), March 27, November 7, 1910.

Akenge, 7 (2 ♂ adult, 1 ♂ juvenile, 4 ♀ juvenile), October 4, 6, 9, 15, 16, 22, 24, 1913.

Niapu, 14 (8 ♂ adult—1 a skull only, 4 ♂ juvenile, 2 ♀ juvenile), August 25, 1910; October 24, November 25, December 7–26, 1913; January 4, 19, 1914.

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[1] R. I. Pocock, 1916, 'On the External Characters of the Mongooses (Mungotidæ).' Proc. Zoöl. Soc. London, I, pp. 349–374, Figs. 1–10.

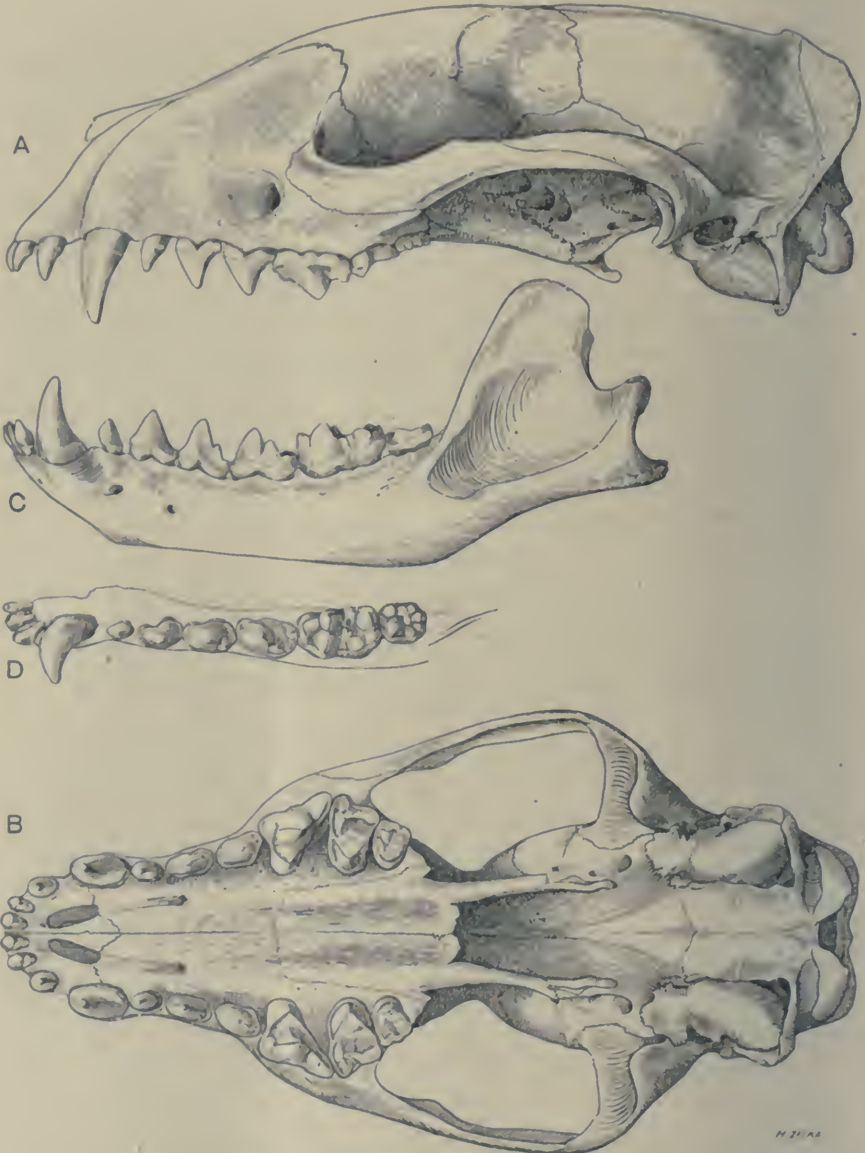

Fig. 12. *Civettictis civetta orientalis.* Skull of young adult male (No. 51818). A, lateral view; B, palatal view; C, lateral view of left mandible; D, crown view of left lower dentition. Four-fifths natural size.

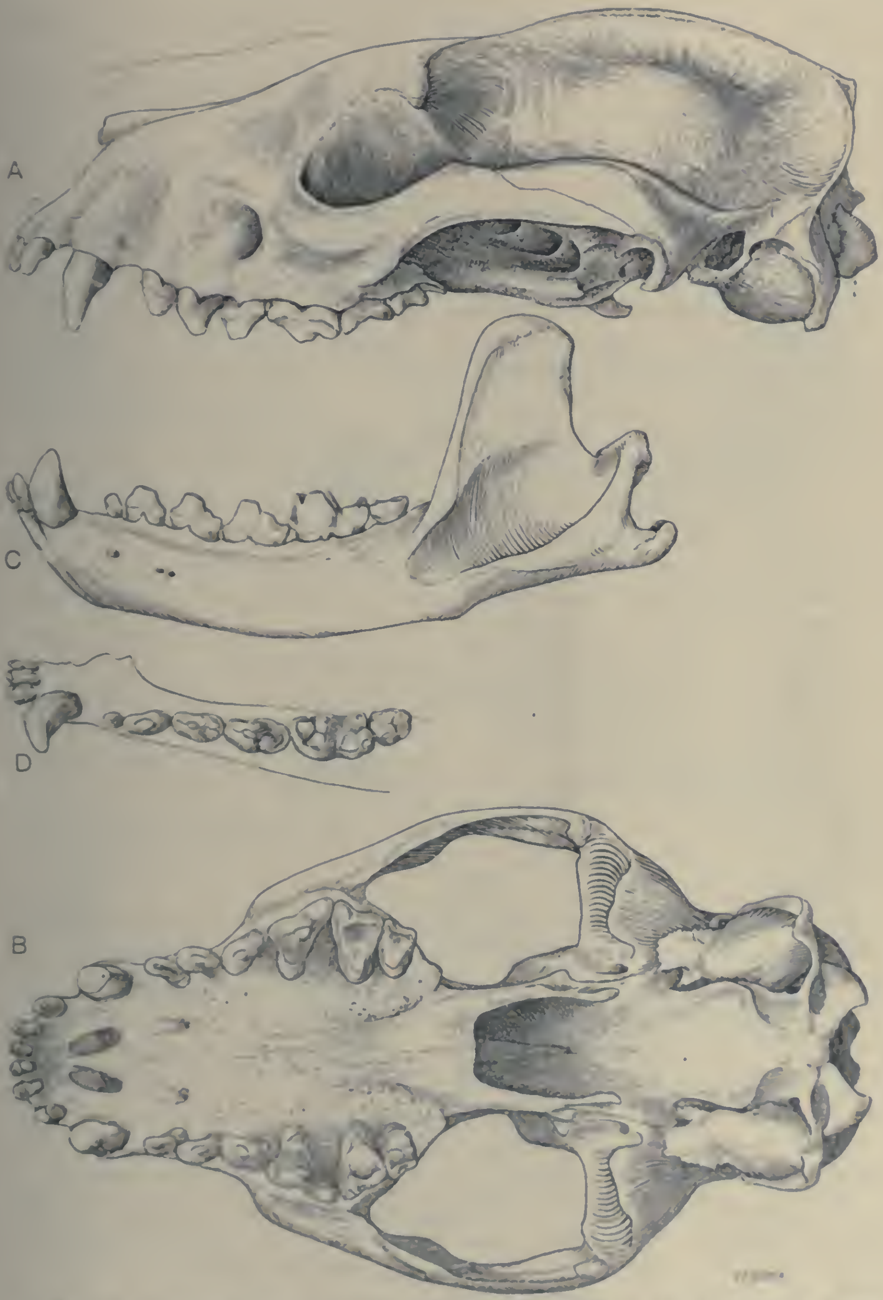

Fig. 13. *Civettictis civetta orientalis.* Skull of senile male (No. 51797). A, lateral view; B, palatal view; C, lateral view of left mandible; D, crown view of left lower dentition. Three-fourths natural size.

Medje, 6 (2 ♂, 3 ♀, 1 sex unknown, all juvenile), March 31, August 25, 29, 1910.

Avakubi, 2 (flat skins, without skulls or measurements), June 23, 1911.

About one-third (eleven) of the specimens are melanistic (Pl. XIII, fig. 1, upper specimen), seven being wholly deep black, and four others less intensely black, in which the normal light pattern is traceable through a veiling of brownish black. The ratio of melanism to the normal (Pl. XIII, fig. 1, lower specimen) is about the same for each locality represented, and is also equally common to both sexes, and to specimens of any age from nurslings to adults.

Of the nine fully adult specimens all are males; in the immature specimens the females are more nearly equal in number to the males.

Among the immature specimens seven have the milk dentition fully developed, but none of the permanent teeth has pierced the gum. As the skulls of specimens at this stage vary considerably in size it is evident that a little time elapses between the full development of the milk teeth and the appearance of the permanent teeth. A younger stage is represented by skulls in which the milk teeth are all fully developed except the first premolars (dp^1 and dp_1), which can be seen through a minute opening in the alveoli but are still below the alveolar plane. In a still younger stage only the incisors and canines are present, which are quite well developed before the cheek-teeth appear. The incisors are the first teeth to be renewed, in one skull the middle pair having been replaced by their permanent successors before the permanent molars had pierced the gum.

In the non-melanistic specimens there is a wide range of variation in coloration between the lightest and darkest. In the lightest (No. 51811, ♂ adult, Niapu; Pl. XII), the dorsal black band of lengthened hairs (dorsal crest) is reduced at the withers to a breadth of 15 mm., and increases to about 35 mm. at the loins, where it is broadest. The area of the light ground color over the greater part of the body is twice as great as that of the black spots and streaks; the white spots on the proximal half of the tail number five on each side, decreasing in size apically, and extending to beyond the middle of the tail, with a sixth spot on the right side beyond the paired ones without a corresponding one on the left; a few white hairs indicate an incipient seventh spot. In another specimen (No. 51802, ♀ adult, Niapu) the dorsal black crest is better developed, the black and white markings approach equality in area, and the white spots on the basal half of the tail are reduced to four pairs, with indications of a fifth.

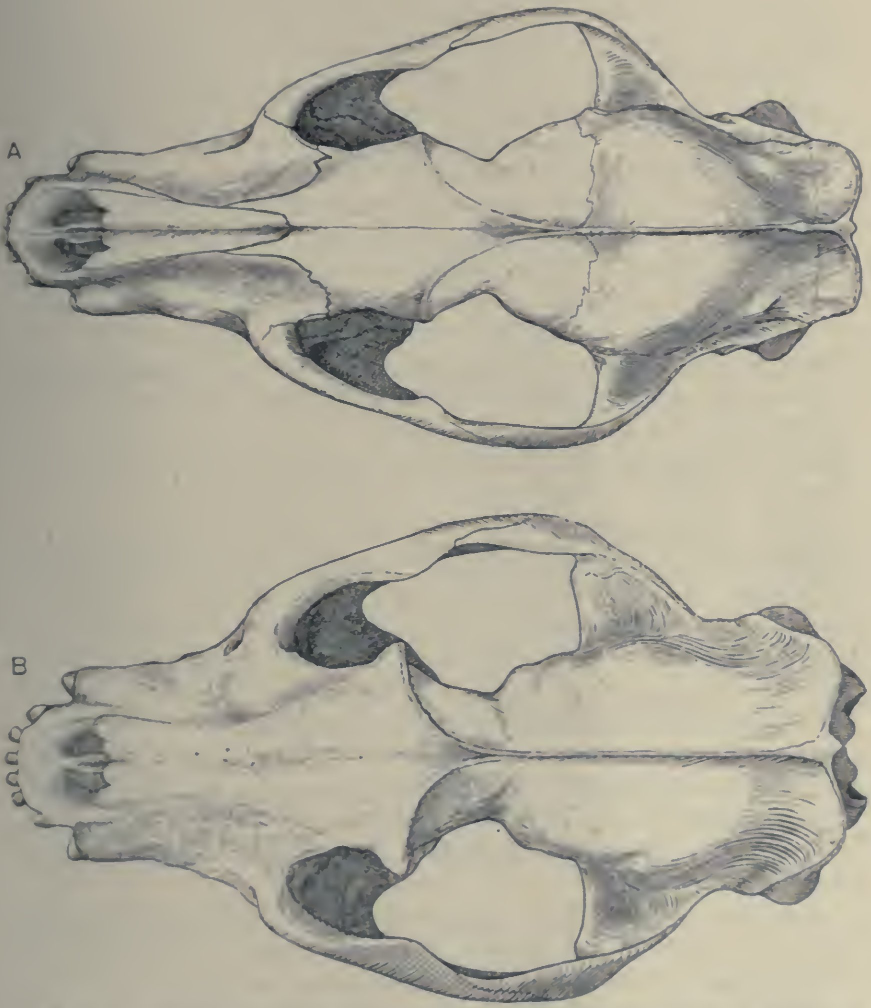

Fig. 14. *Civettictis civetta orientalis.* Comparative dorsal views of skulls. A, young adult male (No. 51818), four-fifths natural size; B, senile male (No. 51797), three-fourths natural size. (See Figs. 12 and 13.)

In the dark non-melanistic specimens from Niapu the dorsal black band has a breadth of 40–60 mm. and the other black markings exceed twice the area of the light interspaces; the white spots on the basal part of the tail vary in different specimens from two to four pairs. An extreme example of the dark phase (aside from the wholly melanistic specimens) is a young female (No. 51813, Niapu, the milk dentition fully developed except dp_1 but the molars still enclosed in the jaw) in fresh unworn pelage, in which the dorsal crest-hairs are very long and cover the whole breadth of the nape, forming a band varying in breadth from 50–60 mm. from the head posteriorly to about the end of the proximal third of the tail; the white ground color on either side of the dorsal band of black is reduced to less than one-fourth of the area of the black spots, so that in general effect the dominant color of the body is black. The rest of the series (excluding those entirely black) is variously intermediate between the light and dark extremes, the greater part inclining to the darker phase. In very dark specimens the foreneck is black, while in very light specimens the white of the sides of the neck meets on the median line.

The condition of the dorsal crest is exceedingly variable; in some specimens it is practically absent, in others irregular and patchy, very little developed in the region of the nape and withers where in other specimens it is most conspicuous. A young female from Niapu (No. 51813), as noted above, exceeds all the others in the prominence of the dorsal crest, and although less than half grown has the pelage very long and full, and its contrasting deep black and clear white coloration renders it one of the most beautiful and striking specimens of the whole series.

Young specimens in the soft first pelage resemble the adults of their respective color phases in the pattern of markings, but the colors are less intense, the black being brownish black and the markings are less sharply defined.

The following table of cranial measurements includes seven skulls from Niapu and two from Akenge. Three skulls of the Niapu series have the cusps of the cheek-teeth slightly worn, being from specimens of early middle-aged individuals. The oldest skull of the seven from Niapu is also the smallest. The single female skull, in which the teeth show no wear, is above the average size of the males, and one of the three largest of the series.

The variation in cranial characters due to age in two male skulls from Akenge is shown in Figs. 12–14. No. 51818 (Figs. 12 and 14A) is a young male in which the permanent dentition is fully developed but the

Collectors' Measurements of Seven Adult Males of *Civettictis civetta orientalis*

Cat. No.	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51805	Niapu	1295	830	465	150	55
51803	"	1240	850	390	135	57
51808	"	1360	840	520	140	50
51809	"	1255	785	470	133	50
51810	"	1280	850	430	132	52
51811	"	1350	845	505	140	55
51797	Akenge	1350	870	480	143	56
Average	**7 ♂**	**1304**	**840**	**466**	**139**	**54**

Measurements of Nine Adult Skulls of *Civettictis civetta orientalis*

Cat. No.	Sex	Locality	Condylobasal Length	Palatal Length	Zygomatic Breadth	Interorbital Breadth	Postorbital Constr.	Breadth at p^4	P^1-m^2	P$_1$-m$_2$	C-m^2
51805	♂	Niapu	155.0	82.3	78.5	29.5	23.8	49.5	50.6	55.0	61.0
51803	♂	"	143.8	75.0	73.8	29.0	21.2	46.1	45.1	51.6	54.8
51808	♂	"	150.6	79.4	75.8	27.8	18.6	45.8	49.3	53.3	58.9
51809	♂	"	145.4	80.8	88.2	29.7	21.9	49.8	51.0	56.0	61.5
51810	♂	"	143.5	77.8	76.7	29.8	21.6	48.0	47.6	52.8	56.6
51811	♂	"	148.0	79.4	79.3	32.8	—	51.0	51.2	54.7	61.6
51815	♂	"	154.0	83.4	80.4	32 9	25.5	49.4	48.4	54.8	60.2
51797	♂	Akenge	151.7	85.0	86.0	31.6	21.0	51.3	46.8	60.0	60.0
51818	♂	"	142.8	76.8	73.5	26.5	22.2	47.7	48.8	54.6	57.9
Average	9 ♂		**149.4**	**80.0**	**79.1**	**29.6**	**22.0**	**48.6**	**48.8**	**54.8**	**59.2**
Minimum	"		142 8	75.0	73.5	26.5	18.6	45.8	45.1	51.6	54.8
Maximum	"		155.0	85.0	88.2	32.9	25.5	51.3	51.2	60.0	61.6

teeth show no trace of wear and the sutures of the skull are still open, even the fronto-parietal, the first to disappear, being still distinct. This skull is of average size for young adults. No. 51797 (Figs. 13 and 14B) is a senile male, in which the canines and molars are greatly worn, the sutures of the skull, except the maxillo-nasal and malar, are wholly obliterated by synostosis, the sagittal and lambdoid crests are enormously developed, and the zygomatic arches and skull walls greatly thickened by excessive osseous deposition due to advanced age. Several of the middle-aged specimens equal or exceed it in both external and cranial measurements. There is nothing to indicate that the animal

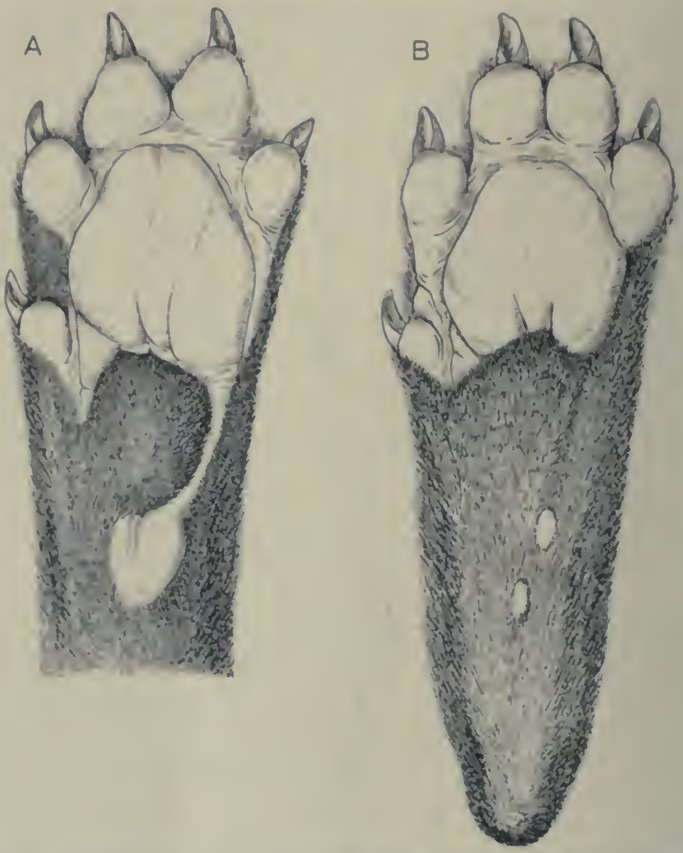

Fig. 15. *Civettictis civetta orientalis* (No. 51803). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

had become decrepit from age, although suffering from a fracture of the left ramus at the junction p_2-p_3, which had formed a suppurating wound.

The purpose of these figures is twofold: (1) to illustrate the skull and dentition of this interesting form, not previously so well figured; (2) to show the wide range of variation due to age between skulls of males of the same species taken at the same locality. The lesson to be derived therefrom is obvious.

The question of the proper designation of the civet of the Upper Congo is at present difficult to settle, and the final decision must be left for the future to determine. The reference of the present Congo series to Matschie's *Viverra civetta orientalis* is wholly provisional.

The *Civettictis civetta* of current nomenclature is clearly a composite group, embracing apparently several more or less well-marked geographical forms. Hence it is necessary to determine, as a first step in the investigation, to which of these forms the original name *Viverra civetta* should be restricted. This fortunately is not difficult, since the primary basis of the name is the Civette of Buffon and Daubenton,[1] the original description and plate of which were based on a spirit specimen obtained in Guinea. Schreber's *Viverra civetta*[2] should be construed as based primarily on the description and figure of Buffon and Daubenton's Civette, Schreber's plate of *Viverra civetta* being a well executed and duly accredited copy of Buffon and Daubenton's plate. His description of *V. civetta* appears to have been taken from a specimen from an unknown locality, which may or may not (probably not) have been referable to the Guinea form. As the specimen was without indicated locality, and the brief description is indeterminate, it seems proper to restrict the name *civetta* to the original "Civette de Guinée," to which the name *civetta* obviously refers and was intended to designate. In fact, in Schreber's list of the plates of Theil 3, as well as on the plate, he ascribes the name *Viverra civetta* to Buffon ("Viverra civetta BUFF.") citing "Buff. IX. tab. 34" for the original of the plate.

The *Viverra poortmanni* of Pucheran was described briefly in 1855[3] and elaborately, with a colored figure, a few years later.[4] The later description is based on the original type, an immature spirits specimen, 754 mm. in total length, with only the milk dentition. The colored plate is from a live adult in the Paris Menagerie, which he states had been living there since 1851, but the locality of its origin is not stated, although probably the Gaboon.[5] Thus the type, and probably the figured specimen of *V. poortmanni*, were doubtless from the same district (French Guinea). Pucheran's description and figure are strikingly in accord in all essential features with Buffon and Daubenton's description and figure of the Civette. In this connection Pucheran compares his Gaboon specimen with five others in the Paris Museum, all from unknown localities. He found them to be so variable in coloration that only two were similar in their external characters, the others differing greatly *inter se*, to which fact he directs the attention of zoölogists as a matter demanding further investigation. He relied, in separating the Congo form from the common civet, upon a character he believed to be constant, namely, the limitation of the black of the cheeks to the region of the eyes, leaving the top of the nose yellowish white, whereas in all the other specimens the black cheek-patches were broadly confluent across the nose. His plate agrees in this respect with Buffon's, a resemblance which he acknowledges, but finding certain discrepancies between Daubenton's and Schreber's descriptions he raises the question as to which of the two should be taken as the basis of the name *Viverra civetta*.[1] He decides in favor of Schreber, ignoring the fact that Buffon's plate unquestionably (as he admits) displays the character on which his *poortmanni* essentially rests, that the type of Buffon's civette and the type of *poortmanni* came from practically the same place, and that Schreber's plate, "si semblable à celle de Buffon," was a copy of Buffon's, and that the specific designation *civetta* was a Latin rendering of Buffon's name *civette*. It is hence evident that *Viverra poortmanni* Pucheran should be construed as a synonym of *Viverra civetta* Schreber.

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[1] Civette [de Guinée] Buffon and Daubenton, 1761, 'Hist. Nat.,' IX, pp. 333–342 (also pp. 299–315 passim), Pls. xxxiv, xxxv. Guinée.—"C'est la civette de Guinée, car nous sommes sûrs que celle que nous avons eue avoit été envoyée vivante de Guinée . . . " (*loc. cit.*, p. 302)

[2] *Viverra civetta* Schreber, 1777, 'Säugthiere,' III, pp. 418, 587, Pl. cxi (from Buffon, as above).

[3] *Viverra poortmanni* Pucheran, 1855, Rev. et Mag. de Zool., (2) VII, Juin, p. 304.—This description is a brief diagnosis, as follows: "Simillima Viverræ Civettæ, sed major, vittâque oculari nigra nasum non transeunte," followed by the statement, "Du Gabon. Envoyé au Musée de Paris par Aubry Lecomte."

[4] *Viverra poortmanni* Pucheran, 1858–1861, Arch. du Mus. d'Hist. nat., X, pp. 109–115, Pl. ix.

[5] "Ce dernier a été figuré pour la collection des vélins de la Bibliothèque du Muséum, et c'est cette figure, presentant tous les caractères attribués par nous à l'espèce en question, que nous avons fait reproduire pour l'annexer à notre travail actuel" (*loc. cit.*, p. 109).

The only other described form of the *civetta*, so far as I am aware, is Matschie's *Viverra civetta orientalis*, described in 1891,[2] from Bagamojo, Zanzibar, to which the author later referred specimens from other parts of the coast region of German East Africa.[3] This form is readily distinguishable from *Civettictis civetta civetta* of the equatorial west coast of Africa by the face pattern alone, the black of the cheeks in *orientalis* uniting above to form a continuous broad band across the nose. In this respect the present large series of specimens from the Rain Forest of the Upper Congo agrees with *orientalis*. It is hardly probable, however, that they will prove to be quite the same. The description of *orientalis* seems to imply that the coast form of German East Africa is paler than the form from the Rain Forest belt of the Upper Congo, as would be expected from the differences in environment. In view, however, of the wide range of variation in color of the Congo series, indicated above, the alleged characters of *orientalis*, aside from the face pattern, fail to be diagnostic. The extent to which the two forms differ can be determined only by comparison of adequate series from the two regions. At this writing no specimens from the type region of *orientalis* are available for examination.

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[1] He also points out a discrepancy between Daubenton's description and plate, through an obvious lapsus, "les chaufrein" being given as black like the cheeks, etc., instead of whitish as represented in the plate.

[2] *Viverra civetta orientalis* Matschie, 1891, Arch. für Naturg., Bd. I, pp. 352, 353.

[3] Matschie, 1895, 'Die Säugethiere Deutsch-Ost-Afrikas,' p. 72, Fig. 40.

Genetta Oken

Genetta Oken, 1816, 'Lehrb. Naturg.,' Theil 3, Abth. 2, p. 1010. Type, by tautonymy, *Viverra genetta* Linnæus.

Genetta pardina fieldiana Du Chaillu

Plates XIV, Figure 1; XV, Figure 2; and Text Figures 16, 20A

Genetta pardina I. Geoffroy, 1832, Mag. de Zool., Cl. I, Pl. viii and related text. Interior of Senegal. In part, as recognized by various later authors.

Genetta fieldiana Du Chaillu, 1860, Proc. Boston Soc. Nat. Hist., VII, November (1859–1861), p. 302. Interior of Gaboon.

? *Genetta stuhlmanni* Thomas (not of Matschie), 1915, Ann. Mag. Nat. Hist., (8) XVI, p. 472. Medje (3), Poko (7 specimens).

The present form differs from *G. stuhlmanni* Matschie, with authentic specimens of which it has been compared, in having the dark markings of the upperparts narrower and more confluent and lighter colored (much less blackish) feet (Pl. XIV, fig. 1).

Represented by 46 specimens, of which 24 are adult and 22 are immature, collected as follows:

Aba, 1 (♀ nearly adult), December 15, 1911.

Faradje, 18 (6 ♂, 12 ♀–9 adult, 9 juvenile), March 5–29, 1911; April 29, December 22, 1912.

Niangara, 3 (♀, all juvenile), December 18, 1910.

Akenge, 4 (all ♂, 2 adult, 2 juvenile), October 9, 14, 19, 24, 1913.

Niapu, 1 (♂ adult), January 9, 1914.

Medje, 17 (10 ♂, 7 ♀), January 25, April 8, 26, May 28, June 26, 28, July 10, 12, 14, 26, August 10, 30, September 22, 26, October 10, 1910.

Avakubi, 1 (♀ juvenile), October 31, 1909.

Stanleyville, 1 (♂ adult), August 6, 1909.

Only about one-third of the specimens are fully adult, another third are subadult, and the other third retain the milk dentition, varying in age from those in the woolly first pelage and in which the milk teeth are just beginning to pierce the gum to those in which the milk teeth are fully mature.

Collectors' measurements of 13 adults (9 males, 4 females), of which 7 are from Medje, 3 from Faradje, and 1 each from Niapu, Akenge, and Stanleyville.

		Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
9	♂	887(835–945)	455(400–510)	470(370–475)	86(75–95)	40(38–42)
4	♀	862(845–870)	457(425–490)	406(380–420)	85(all 85)	40(all 40)

Measurements of Ten Adult Skulls of *Genetta pardina fieldiana* (Mainly from Medje and Faradje)

Cat No.	Sex and Age	Condylo-incisive Length	Palatal Length	Palatal Breadth at p^4	Maxillary Toothrow p^1-m^2	Zygomatic Breadth	Least Interorbital Breadth	Least Postorbital Breadth	Breadth Braincase
[1]51710	♂ ad.	86.8	39.6	26.4	28.1	42.3	11.3	7.5	28.5
[1]51523	♂ ad.	92.0	42.3	27.9	30.1	46.0	13.2	7.9	30.8
[1]51712	♂ ad.	85.1	38.4	25.9	27.1	41.2	11.6	11.0	28.8
[3]51709	♂ yg. ad.	92.1	43.0	25.9	28.6	44.2	13.1	11.6	30.0
[2]51533	♂ old ad.	82.2	39.1	23.6	28.1	44.4	12.9	8.8	29.4
[4]51541	♂ old ad.	89.5	41.6	26.5	27.1	44.4	12.2	11.0	30.2
[2]51536	♂ ad.	78.3	36.7	21.7	24.0	37.6	11.4	10.4	29.0
Average	**7 ♂**	**86.5**	**40.1**	**25.4**	**27.6**	**42.9**	**12.3**	**9.7**	**29.5**
Minimum		78.3	36.7	21.7	24.0	37.6	11.3	7.5	28.5
Maximum		92.1	43.0	27.9	30.1	46.0	13.2	11.6	30.8
[1]51518	♀ old ad.	86.6	40.5	27.3	26.3	44.2	12.1	10.6	30.7
[2]51532	♀ ad.	79.1	36.5	23.5	26.4	40.4	11.1	10.6	28.2
[2]51529	♀ ad.	82.3	37.6	25.1	27.1	39.2	12.6	12.1	28.4

Among the large number of specimens representing the present species are young of various stages which illustrate the changes in coloration from nurslings to mature individuals.

Young in the first woolly coat, with the milk teeth still enclosed in the gum, have the ground color of the upperparts dark ash-gray and the markings dull black. The underparts are uniform creamy white, with the fur so short that it does not fully conceal the skin. The light tail-rings are clear white on the ventral side but on the dorsal are of the same gray tone as the ground color of the upperparts; the intervening dark rings are also similar in color to the dark bands and spots of the dorsal area. This stage is represented by five specimens, which have a total length of about 270 to 285 mm. In two others (total length about 300 to 330 mm.) the pelage is a little longer, and the dark markings are a little blacker. In three others somewhat farther advanced (total length 360 to 390 mm.) the coloration is still similar to that of the early stages, but the pelage is less woolly through replacement or by lengthening of the overlying hair, and the black markings are in stronger contrast with the ground color. In the largest of the three the ground color is beginning to assume a distinctly buffy tone, and the light tail-rings are nearly as clear white above as below.

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[1] Medje. [2] Faradje. [3] Stanleyville. [4] Niapu.

In the next stage available, represented by six half-grown specimens (total length 415 to about 450 mm., with one 475 mm. long), the pelage appears to have been nearly (in the younger) or fully (in the older ones) renewed, the dull gray of the ground color having been replaced by deep buff, and in some of them there is a mixture of rufous hairs in the otherwise intensely black markings of the upperparts. In the older specimens of this group the adult coloration has been fully acquired without, however, any modification of the pattern. The milk dentition has become mature, except that the first premolar has not pierced the gum, and there is no visible indication of the first molar (Nos. 51068 and 51516). The change from the gray early stage to the condition of maturity is thus very gradual and occurs with evidence of its acquisition by a progressive change and not by a single abrupt transition. Neither in the younger stages is there a marked individuality in specimens of the same age, as occurs so markedly among adults.

This species, like its congeners, presents, when adult, a wide range of purely individual variation, not only in size and coloration but in cranial characters and in the teeth, especially in the size and form of m^2. The variations in size, both externally and in the skull, are indicated in a general way in the measurements given above. In coloration the variation from the norm is toward, on the one hand, an extreme gray phase with blackish markings, on the other, a rufous phase with deep brownish buff instead of a gray ground color and dark brown markings (black strongly mixed with rufous). The dark tail-rings are black or blackish in both; the light tail-rings are much lighter in the gray extreme than in the rufous extreme, being white or whitish in the former and strongly suffused above with pale rufous in the latter. The light tail-rings are usually seven, but vary in number from six to eight, besides the terminal half ring, broken by the black of the upper side of the apical portion of the tail. The light rings are usually much broader on the sides and under surface of the tail than on the mid-dorsal line, where in some specimens they are nearly obsolete, especially beyond the fourth from the base. The light rings are occasionally as wide as the adjoining dark ones, but usually somewhat narrower, and frequently only about half the breadth of the dark ones. The black tail-tip varies in extent (measured from the last full light ring on the dorsal side) from 70 to 150 mm. (in one specimen 220 mm.).

The more prominent markings are a heavy continuous dark stripe on either side of the neck from the top of the head to just behind the forearms (Pls. XIV, fig. 1 and XV, fig. 2), and a median dark, broad, solid dorsal band from the shoulders to the base of the tail. This band is often intensely black, but more commonly with a mixture of rufous, depending upon the degree of erythrism characterizing the general coloration. This is further emphasized by the hairs composing it being longer than the adjoining pelage.

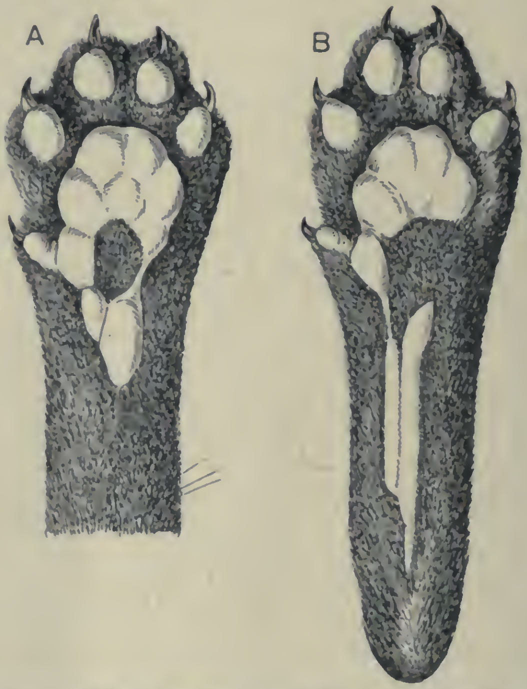

Fig. 16. *Genetta pardina fieldiana* (No. 51541). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

The color of the underparts varies in correlation with that of the sides and back, being dingy gray in specimens having the ground color of the upperparts clear gray, and yellowish buff in those with rufous upperparts. In both types the dusky blotches on the chest vary greatly in number, size, and distinctness in different specimens.

In general the color pattern resembles that of *G. stuhlmanni* Matschie, but in the latter the dark markings are broader and more conspicuous, being less confluent and more sharply outlined; the fore and hind limbs, and the feet especially, are much darker.

It is unnecessary to describe in detail the irregularities in the size, number of rows and the arrangement of the spots on the sides of the body, since they are more or less different in each specimen, and often different on the two sides of the same specimen. Neither is it necessary to more than note that the relative width of the light and dark tail-rings is exceedingly unstable and hence has no taxonomic value. Yet such inconstant features were once made the basis of an elaborate synopsis of the species of the genus *Genetta*,[1] noteworthy mainly for its puerility and pernicious results. In the introductory comment to a six-page table for the determination of the species the author gives a list of the twenty-four species previously indicated, only one of which (a case where a species was intentionally renamed) is relegated to synonymy, while ten new ones are added (besides two others indicated but not named). While some of the new forms are doubtless tenable, and can be identified from the brief indications of their characters, others are hopelessly indeterminable without recourse to the specimens on which they were based. In discussing individual and geographical variation he formulates several generalizations: (1) That the color and arrangement of the spots

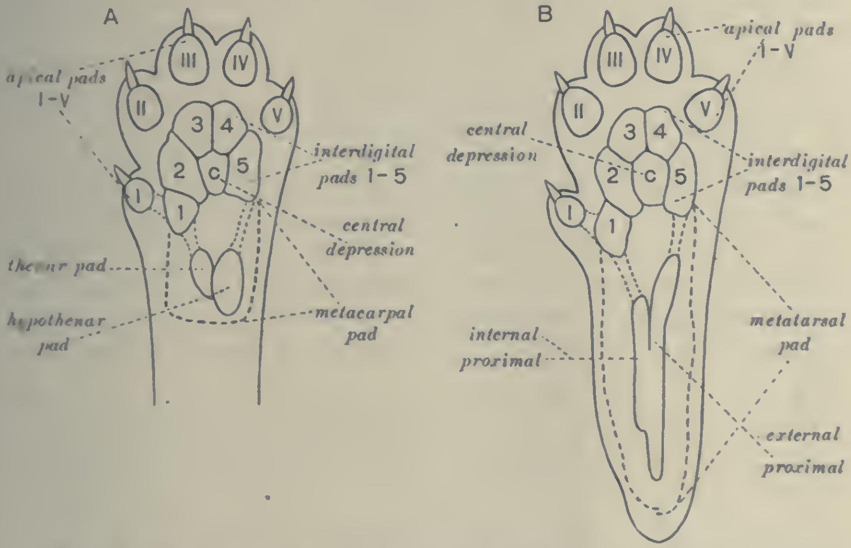
A
apical pads I–V
III
IV
II
V
3
4
2
c
5
I
1
interdigital pads 1–5
central depression
thenar pad
hypothenar pad
metacarpal pad
B
apical pads I–V
III
IV
II
V
central depression
3
4
2
c
5
I
1
interdigital pads 1–5
metatarsal pad
internal proximal
external proximal

Fig. 17. Diagrams of: A, palmar surface of left fore foot; and B, plantar surface of left hind foot as found in genets.

Though in general outline the diagrams represent the footpads of *Genetta victoriæ*, they are applicable to practically all the carnivores.

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[1] 1902, 'Ueber die individuellen und geographischen Abänderungen der Ginsterkatzen.' By Paul Matschie. Verhandl. V. Internat. Zool. Congress., pp. 1128–1144, 1 col. pl.

does not vary during the life of the same individual after the first renewal of the pelage (contrary to his previous belief), although there may be a variation in tone, correlated with season. (2) That there is a marked sexual variation, females having a lighter ground color and darker markings than males. This conclusion is shown to be erroneous by the large series, representing three species, collected by the American Museum Congo Expedition. On assorting the specimens into series on the basis of sex, it is found, in the case of each species, that the specimens having a light ground color and dark markings are about equally divided between the sexes, the specimens with a grayish ground color and black streaks and spots being as frequently males as females. (3) He qualifies this later by admitting that the color of the dorsal bands and spots varies less in some forms than in others and must therefore be used with discretion as a distinctive character. (4) "Ich unterscheide jetzt 34 Arten von Ginsterkatzen [*Genetta*], deren Verbreitungsgebiete nur in gewissen Gegenden etwas übereinander greifen." He finds, however (very naturally), that the darkest species, with the greatest number of spots, live in forested regions and the lightest in open or desert countries.[1]

The genet recorded above as *Genetta pardina fieldiana* is of course referable to the "*pardina* group," but the type specimen of I. Geoffroy's *Genetta pardina* was a living specimen in the Paris zoölogical gardens said to have been received from the interior of Senegal, and although his description and colored plate point to a genet of the general character of the present species, it is hardly proper, on general principles, to apply unqualifiedly the name to the Upper Congo form of the group. The earliest name for any member of the group is *Genetta poensis* Waterhouse (1838), but the insular character of the type locality again renders the name unsatisfactory in the present connection without confirmation by material from Fernando Po, which is unfortunately not available.[2] *Genetta fieldiana* Du Chaillu (1860), from the interior of Gaboon, which unquestionably refers to an animal of the *pardina* type, is therefore provisionally accepted instead of any of the various later names based on specimens from the Congo coast region. While the color pattern resembles in a general way that of *G. stuhlmanni* Matschie, direct comparison with practically topotype material of *stuhlmanni* leads me to believe that the present Congo series is not satisfactorily referable to *stuhlmanni*, although the gray phase of the Congo series referred to above indicates near relationship.

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[1] The following remarks by Hollister, published some three months after my studies of this group were prepared for publication, are confirmatory of the above criticisms of Matschie's worthless key to the species of *Genetta*. Hollister says: "The characters given by Matschie, in his key to the species [of *Genetta*], to separate *dongalana* from *neumanni* are all absolutely valueless; the relative breadth of the light and dark rings on the tail differs in specimens collected the same day in the same camp and is greatly changed temporarily by renewal from the old long coat into fresh hair. This is well shown by our material [11 specimens]. The numbers of dark and light rings on the tail are easily miscounted, and two persons will frequently count them differently on the same skin, owing to the obscurity of the dark basal rings, which may or may not be counted."—1918, U. S. Nat. Mus. Bull. 99, pt. 1, p 117, under *Genetta dongalana neumanni*

[2] Pocock's comment on the type of *Genetta poensis* (1907, Proc. Zoöl. Soc. London, II, pp 1039–1041) seems to indicate that *G. poensis* is not really referable to the *pardina* group, and that the type locality was probably not Fernando Po; in his opinion, the type of *G. poensis* Waterhouse and the other material treated in the paper in which *poensis* was described came "from Lower Nigeria or thereabouts." He further states that *G. poensis* has not been recorded from that island since the publication of the original description.

Genetta servalina Pucheran

Plates XIV, Figure 2; XV, Figure 1; and Text Figures 18, 19, 20B

Genetta servalina PUCHERAN, 1855, Rev. Mag. Zool., (2) VII, p. 154; 1858, Arch. Mus. Paris, X, p. 115, Pl. x. Type locality, Gaboon.

Genetta bettoni THOMAS (not of Thomas 1902), 1915, Ann. Mag. Nat. Hist., (8) XVI, p. 472. Moera (1), Medje (1), Poko (2 specimens).

Differs from *Genetta bettoni* Thomas (based on a specimen from the Mau district, altitude 7600 feet, British East Africa, in much larger size and somewhat different coloration. (Compared with a series of eight specimens of *bettoni* from near the type locality of that species.)

Represented by 54 specimens (29 ♂, 24 ♀, 1 sex unknown, of which 32 are adult and 22 juvenile), collected as follows:

Bafuka,[1] 1 (♂ adult), March 15, 1913.

Faradje, 9 (6 ♂, 3 ♀, all juvenile), March 14, 22, 29, 1911.

Niangara, 7 (4 ♂, 3 ♀–5 juvenile), November 16, 20, December 18, 21, 1910.

Akenge, 6 (2 ♂, 4 ♀ – 5 adult, 1 juvenile), October 9–27, 1913.

Niapu, 23 (10 ♂, 12 ♀, 1 sex unknown—21 adult, 2 juvenile), November 19, 28, December 2–25, 1913; January 8, 18, 19, 1914.

Medje, 7 (6 ♂, 1 ♀), January 19, April 9, May 29, June 6, July 26, October 14, 1910.

Ibambi,[2] 1 (♀ juvenile), May 8, 1910.

Collectors' measurements of 8 adult males and 10 adult females from Niapu:

		Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
8	♂	966(910–1040)	489(464–531)	475(440–520)	92.5(87–97)	40.6(38–45)
10	♀	920(900– 950)	485(460–500)	446(410–480)	88.7(85–93)	40.6(40–42)

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[1] Sixty miles north of Niangara.
[2] Near Medje.

Measurements of Six Adult Male and Eight Adult Female Skulls of *Genetta servalina* from Niapu

Cat. No.	Sex	Condylo-incisive Length	Palatal Length	Palatal Breadth outside to outside p^4	Maxillary Toothrow (p^1-m^2)	Zygomatic Breadth	Least Interorbital Breadth	Least Postorbital Breadth	Breadth Braincase
51559	♂	92.4	44.9	26.2	29.2	43.8	13.1	14.4	31.5
51562	♂	91.5	44.3	25.5	29.3	46.0	13.0	13.2	30.3
51967	♂	87.4	42.7	23.4	28.5	40.5	13.1	13.6	29.0
51571	♂	87.9	43.1	24.9	28.2	43.5	13.5	14.2	29.5
51573	♂	94.7	46.0	25.3	29.8	44.9	12.7	14.1	30.9
51576	♂	89.2	——	——	26.6	——	11.5	13.5	30.2
Average	**6♂**	**90.2**	**44.2**	**25.1**	**28.6**	**43.4**	**12.8**	**13.8**	**30.2**
Minimum	"	87.4	42.7	23.4	26.6	40.5	11.5	13.2	29.0
Maximum	"	94.7	46.0	26.2	29.8	46.0	13.5	14.4	31.5
51558	♀	89.2	40.6	25.0	29.2	42.5	12.5	14.8	29.6
51560	♀	87.7	41.5	26.5	28.7	43.0	13.0	13.5	29.5
51561	♀	88.5	43.4	23.6	27.1	43.4	12.7	14.4	30.7
51566	♀	90.2	46.2	25.7	29.5	41.7	11.7	11.5	30.6
51568	♀	90.4	44.6	24.6	28.4	42.0	11.6	12.2	30.9
51570	♀	85.8	40.9	25.4	27.0	43.4	13.0	13.8	29.3
51474	♀	88.4	42.8	25.1	27.8	46.4	12.2	15.4	31.0
51577	♀	86.8	42.7	24.6	27.8	39.6	12.0	12.9	30.2
Average	**8♀**	**88.4**	**42.8**	**25.1**	**28.4**	**42.7**	**12.4**	**13.3**	**30.2**
Minimum	"	85.8	40.6	23.6	27.0	39.6	11.6	11.5	29.3
Maximum	"	90.4	46.2	26.5	29.5	46.4	13.0	15.4	31.0

The collectors' measurements of three adults from Medje are of interest in respect to individual variation, the largest of the three being the younger of the two males, while the female, long past middle age, is the smallest adult female in the total series of twelve skulls of the present species. The collectors' measurements of these three specimens and of two adults from Akenge (those of three others from this locality are not available) are appended, as follows:

Cat. No.	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51542	Medje	♂	944	490	450	87	—
51543	"	♂	975	510	465	92	46
51546	"	♀	840	445	395	80	42
51553	Akenge	♀	910	465	445	90	40
51556	"	♀	975	490	485	95	41

Measurements of Eight Adult Skulls of *Genetta servalina* from Medje and Akenge

Cat. No.	Locality	Sex	Condylo-incisive Length	Palatal Length	Palatal Breadth (across p^4)	Maxillary Toothrow (p^1-m^1)	Zygomatic Breadth	Least Interorbital Breadth	Least Postorbital Breadth	Breadth Braincase
51542	Medje	♂	89.1	43.4	26.3	28.9	45.0	13.7	11.5	29.9
51543	"	♂	91.3	45.3	24.2	29.2	40.7	12.5	13.1	31.2
51546	"	♀	81.3	37.8	24.1	24.4	42.1	11.1	12.2	29.5
51554	Akenge	♂	90.0	43.4	27.6	28.8	48.9	14.5	13.8	29.9
51555	"	♂	89.0	41.5	25.9	28.7	47.2	13.6	13.9	29.5
51552	"	♀	90.2	44.8	26.5	29.5	45.5	13.4	14.3	30.5
51553	"	♀	87.4	41.2	25.6	28.1	41.2	12.6	12.6	30.4
51556	"	♀	89.3	46.0	26.9	29.8	41.3	12.4	13.7	30.3
Average		**4 ♂**	**89.8**	**43.4**	**26.0**	**28.4**	**45.5**	**13.6**	**13.3**	**30.2**
"		**4 ♀**	**87.5**	**42.2**	**25.8**	**27.9**	**42.5**	**12.4**	**13.2**	**30.2**

No. 51567 (adult ♂) from Niapu has a supernumerary molar (m^3) on each side of the upper jaw, with normal dentition in the lower jaw. The additional m^3 has normal position at the end of the toothrow, as shown in Fig. 18. Thomas has recorded similar cases in specimens of *Herpestes gracilis* and *Crossarchus zebra*.[1]

The profuse broad, deep, black markings of the upperparts, narrowly separated by the lighter ground color, the large number and narrowness of the light tail-rings, the dark brown feet and inside of the limbs, and the heavy spotting of the underparts, are the prominent features of the present form (Pl. XIV, fig. 2). It is of course variable in respect to all of them. As in other genets, the ground color varies from gray to ochraceous buff, the prevailing tone being rich deep buff, which in high-colored specimens tinges also the usually nearly clear white annulations of the tail. In the lighter specimens the ground color of the underparts is a dingy gray washed faintly with buff; in the darker specimens it is rather strong buff, deepening in extreme specimens to dingy ochraceous. The light yellowish spot on the upper surface of the hind foot, especially mentioned in the description of the type of *servalina*, is a mark common to most genets, and is of an exceedingly variable character, conspicuously developed in some individuals of the present series and obsolete in others, and often is also faintly indicated on the forefeet. The dark parts of the feet also vary in different specimens from pale brown to blackish.

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[1] 1882, Proc. Zoöl. Soc. London, pp. 61, 62.

The light annulations of the tail are usually complete rings, but occasionally the last apical ring is not quite closed above, and is also sometimes a double ring as seen from above, being divided into two by the intrusion of black. The light rings, counted from below, usually are ten in number, but almost as frequently eleven occur, and in exceptional cases they vary to nine or twelve. Thus by actual count of twenty-nine specimens fifteen had ten white rings, ten had eleven, two had twelve, and two others only nine. The extreme tip of the tail is brown for about an inch, varying in different specimens from light wood-brown to blackish brown, the light tip being preceded by a black ring. The white rings are of nearly uniform width, their breadth varying from about one-third to one-half the breadth of the intervening black rings, varying slightly in this respect in different specimens, and in color from clear white to faintly yellowish white.

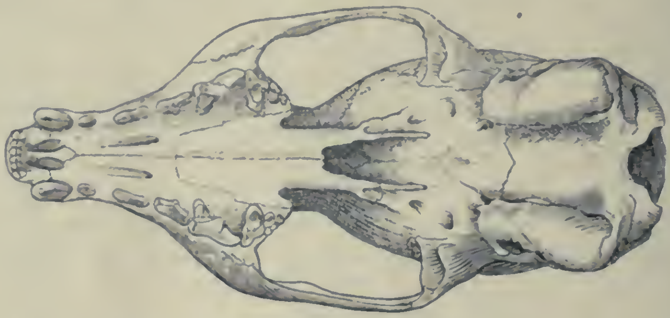

Fig. 18. *Genetta servalina.* Palatal view of skull of adult male (No. 51567), showing a supernumerary molar (m^3) on each side of upper jaw. Natural size.

This species is provisionally referred to *G. servalina* of Pucheran, whose description and colored figure are quite in agreement with the present series. Furthermore, it seems, in view of the color variations in the present series, safe to assume that Pucheran's *G. aubryana* is merely the light or grayish phase of his *G. servalina*, the types of both being from the same locality and collector (Gaboon, Aubry Lecomte).[1] It is probable that a direct comparison of the present series with a similar series from the Gaboon would show the need of a distinctive name for the Upper Congo form. That the latter is not referable to *G. bettoni*

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[1] In this connection see Lönnberg on the "Genets of the *Genetta servalina*-group" (1917, Kungl. Sven. Vet. Ak. Handl., LVIII, No. 2, September 1, pp. 56–60), in which *G. servalina*, *G. aubryana*, *G. bettoni*, etc., are considered, mainly on the basis of the literature of the group. For a specimen from Masisi, near Lake Kivu, and two specimens from Beni, one a young male, he provisionally proposes the name *Genetta servalina intensa* (*loc. cit.*, p. 59, in text), on account of their "more pronounced pattern" of color markings.

Thomas, from the high plateau region of British East Africa, is made evident by direct comparison with a series of eight specimens from near the type locality of *bettoni*. While there is in general effect a resemblance in coloration, there is a marked difference in certain details, *bettoni* having only nine light tail-rings instead of ten or eleven, as in *servalina*. In general coloration *bettoni* is decidedly darker, especially on the feet and underparts, and the ground color is a deeper and more intense ochraceous, equaled by only a few of the most intensely colored specimens of the Congo series. Also, in general effect, the markings appear broader and the ground color between them more restricted. The difference in size also is especially noteworthy, as shown by the following comparative measurements. The eight specimens of the *bettoni* series were collected on the Rainsford expedition of the American Museum in 1913, on the Nzoia Plateau at altitudes of 6000 to 7000 feet, British East Africa. The external measurements were taken by Jenness Richardson, a well-trained collector, from the specimens in the flesh, and the specimens reached the Museum in exceptionally fine condition.

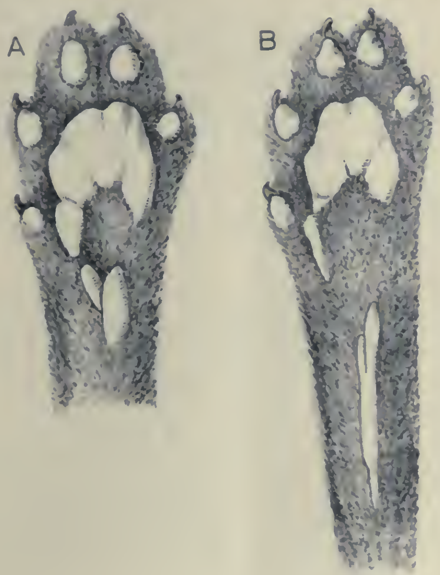

Fig. 19. *Genetta servalina* (No. 51559). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

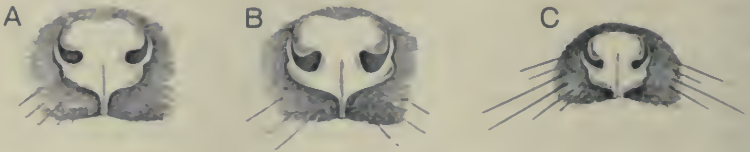

Fig. 20. Rhinarium. A, *Genetta pardina fieldiana* (No. 51538); B, *Genetta servalina* (No. 51559); C, *Poiana richardsoni ochracea* (No. 51439). All natural size.

		Total Length	Tail Vertebræ	Hind Foot
Congo Series:	8 ♂	966 (910–1040)	475 (440–520)	92.5 (87–97)
" "	10 ♀	920 (900– 950)	446 (410–480)	88.7 (85–93)
Nzoia Series:	5 ♂	835 (800– 855)	379 (361–400)	81.0 (76–85)
" "	3 ♀	801 (793– 800)	365 (359–368)	76.0 (73–79)

The principal measurements of the skulls of the *bettoni* series are as follows:

Measurements of Five Adult Male and Three Adult Female Skulls of *Genetta bettoni* from Nzoia Plateau, British East Africa (Same specimens as above)

Cat. No.	Sex and Age	Condylo-incisive Length	Palatal Length	Palatal Breadth at p^4	Maxillary Toothrow p^1-m^2	Zygomatic Breadth	Least Interorbital Breadth	Least Postorbital Breadth	Braincase Breadth
36014	♂ ad.	82.7	40.7	23.6	27.2	40.8	11.7	12.9	29.2
36015	♂ "	81.6	40.4	23.4	25.4	40.2	12.0	13.4	29.7
36016	♂ "	78.6	38.9	21.6	24.5	40.0	11.8	11.9	28.5
36017	♂ "	81.1	40.8	21.4	25.3	37.9	12.1	13.5	29.2
36020	♂ "	80.6	38.7	23.5	25.9	40.7	12.1	12.6	29.4
36013	♀ "	80.6	37.2	21.1	24.4	37.1	11.3	13.4	28.9
36018	♀ "	78.5	38.2	——	25.2	39.8	10.9	10.8	29.4
36019	♀ "	78.8	37.6	21.6	24.1	38.0	11.7	11.8	28.9
Average	**5** ♂	**80.9**	**36.5**	**22.4**	**25.5**	**39.5**	**11.9**	**12.9**	**29.2**
Minimum	"	78.6	37.2	21.1	24.4	37.1	11.3	11.9	28.5
Maximum	"	82.7	40.8	23.6	27.2	40.8	12.1	13.5	29.7
Congo	**6** ♂	**90.2**	**44.2**	**25.1**	**28.6**	**43.4**	**12.8**	**13.8**	**30.2**
Speci-	"	87.4	42.7	23.4	26.6	40.5	11.5	13.2	29.0
mens:	"	94.7	46.0	26.2	29.8	46.0	13.5	14.4	31.5
Averages	**8** ♀	**88.4**	**42.8**	**25.1**	**28.4**	**42.7**	**12.4**	**13.3**	**30.2**
and	"	85.8	40.6	23.6	27.0	39.6	11.6	11.5	29.3
Extremes	"	90.4	46.2	26.5	29.5	46.4	13.0	15.4	31.0

The difference in size between the Congo and *G. bettoni* series indicates that they have no very close relationship, and, considering the geographical conditions of their respective habitats, may well be regarded as specifically separable. In external measurements *bettoni* averages one-seventh smaller than the Congo form, while the skull of *bettoni* is one-third less massive, with a correspondingly striking reduction in the size of the teeth. In features other than size the skulls differ but little in structural details.

Genetta stuhlmanni Matschie

Genetta pardina MATSCHIE, 1895, 'Säugethiere Deutsch-Ost-Afrikas,' pp. 73, 146. Part.

Genetta stuhlmanni MATSCHIE, 1902, Verhandl. V. Internat. Zool. Congress., p. 1142. Bukoba, Uganda.

Represented by one specimen, skin and skull, collected and kindly presented to the Congo Expedition by Dr. J. Bequaert. It was taken near Lake Kivu.

This specimen is from the type region of the species. The ground color of the upperparts is gray, with a faint buffy tone on the flanks. The spots and bands are intense black and very broad without any mixture of rufous hairs. The light tail-bands are narrow, only about half as wide as the intervening black rings; they number only four, are strongly defined on the ventral side of the tail, but only obscurely indicated above. The apical two-thirds of the tail is wholly black, except for a slight indication of a fifth light ring on the lower surface. The foreneck is gray, the rest of the ventral area washed with buffy, strongest laterally.

This specimen differs strikingly from the large Congo series recorded above as *G. pardina fieldiana*, even from the gray specimens of that series, in the greater breadth and intense blackness of the dark spots and bands. It strongly resembles the gray style of *stuhlmanni* from British East Africa, its long black tail-tip being probably merely an individual peculiarity.

Genetta victoriæ Thomas

Plates XVI; XVII, Figure 1; and Text Figures 17, 22, 23 C–D, 24B, 25B, 27, 28B and D, 29B and D, 30B, 31B, 32B, 33B

Genetta victoriæ THOMAS, 1901, Proc. Zoöl. Soc. London, II, p. 87, Pl. v (colored). Type locality, "Entebbe, Uganda" (=Congo Forest, Semliki River). Type, a skin without skull.

Genetta victoriæ THOMAS AND WROUGHTON, 1910, Trans. Zoöl. Soc. London, XIX, pt. 5, March, p. 494. Avakubi, 1 specimen, flat skin without skull.

Genetta victoriæ Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 471. Moera (1), Mawambi (1), Peli-Peli (near Stanleyville) (1 specimen), Belgian Congo.

Represented by 30 specimens (21 adult, mostly males) collected as follows:

Akenge, 1 (♂ adult), September 29, 1913.

Medje, 3 (1 ♂ adult, 2 native-made skins, without skulls), April 10, 1910.

Niapu, 24 (19 ♂, 5 ♀), November 13–30, December 1–31, 1913; January 5, 23, 1914.

Also 2 native-made skins, without field data or skulls.

Collectors' measurements of 18 adults (13 males, 5 females) from Niapu:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
13 ♂	1017(983–1060)	573(560–600)	444(425–480)	101(100–105)	48.0(45.52)
5 ♀	1019(965–1060)	573(550–595)	448(415–490)	100(98–103)	46.8(45.50)

Genetta victoriæ was originally based on a single specimen collected by Sir Harry Johnston in the Congo Forest, on the Semliki River,[1] a skin without skull or field measurements. Three specimens have since been recorded (*loc. cit., supra*) from the Belgian Congo, but without comment. The present series of thirty specimens was collected mainly (twenty-four specimens) at Niapu with six from neighboring localities; as always in the case of our Congo Expedition mammals, they carry full field data and are in excellent condition. It has seemed desirable therefore to make liberal use of this magnificent material, representing the largest and handsomest, as well as one of the least known, species of the genus *Genetta*.[2]

The Niapu specimens are nearly all adult (none retains the milk dentition) and by singular chance the males outnumber the females more than three to one. They were all collected in November and December, 1913, except two, taken the following January. They thus form an excellent series for illustrating the normal range of individual variation in the species.

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[1] Sir Harry states (1902, 'The Uganda Protectorate,' I, p. 205): "I am sure that this north-eastern portion of the Congo Forest contains many strange or little-known mammals, birds, and insects. Besides the okapi. . . we obtained the skin of a remarkable new genet-cat. This I took at the time to be a civet. . . . but it turns out on examination to be a large new species of genet. It was named by Mr. Oldfield Thomas *Genetta victoriæ*. This genet was obtained from a very dense part of the forest [on the Semliki River]." Hence not at Entebbe, situated far to the eastward in Uganda, on the northern shore of Lake Victoria, the type locality given in the original description.

[2] The skull is figured on pp. 137-138 (Figs. 22, 23C-D, and 24B) in comparison with the type skull of the new genus *Osbornictis* on pp. 136, 138 (Figs. 21, 23 A-B, and 24 A.

Measurements of Fifteen Adult Male and Four Adult Female Skulls of *Genetta victoriæ* from Niapu

Cat. No.	Sex	Condylo-incisive Length	Palatal Length	Palatal Breadth across p^4	Maxillary Toothrow (p^1-m^2)	Zygomatic Breadth	Least Interorbital Breadth	Least Postorbital Breadth	Breadth Braincase
51413	♂	115.4	56.4	34.0	37.5	——	18.7	14.9	36.2
51415	♂	111.8	53.1	32.1	35.6	58.5	17.7	16.8	34.9
51416	♂	109.4	52.8	30.9	36.4	54.9	17.4	15.6	33.2
51418	♂	110.6	54.1	34.3	38.1	54.3	17.2	15.6	35.1
51419	♂	111.8	53.2	31.2	36.2	53.6	17.6	14.6	34.7
51420	♂	111.8	54.9	32.8	36.4	56.5	16.1	14.3	35.7
51421	♂	108.8	52.3	32.0	37.0	51.0	16.6	14.8	34.1
51425	♂	110.0	53.5	31.1	35.0	——	17.6	14.1	33.1
51426	♂	108.1	53.3	32.7	36.4	——	17.4	——	35.0
51430	♂	108.6	54.5	31.6	34.6	55.5	16.3	15.0	34.2
51431	♂	110.0	51.8	32.8	34.6	——	18.2	15.5	33.7
51432	♂	110.2	53.0	33.0	36.4	56.7	18.0	14.6	34.1
51414	♂	112.3	54.7	32.7	36.3	57.1	18.0	14.6	34.2
51422	♂	108.7	53.9	32.5	37.4	56.5	18.1	14.5	33.2
51424	♂	112.4	50.7	33.1	38.6	56.0	17.8	15.2	34.3
Average	**15 ♂**	**110.6**	**53.5**	**32.4**	**36.4**	**55.5**	**17.5**	**15.0**	**34.7**
Minimum	"	108.1	50.7	30.9	34.6	51.0	16.1	14.1	33.1
Maximum	"	115.4	56.4	34.3	38.6	58.5	18.7	16.8	36.2
51411	♀	109.7	52.1	32.0	32.0	54.5	17.2	14.0	33.9
51412	♀	107.5	53.4	32.3	32.3	54.3	17.3	15.1	34.2
51423	♀	——	53.4	33.2	33.2	——	16.8	12.5	——
51427	♀	105.6	49.2	32.5	32.5	52.3	17.0	15.3	32.2
Average	**4 ♀**	**107.6**	**52.0**	**32.5**	**32.5**	**53.7**	**17.1**	**14.2**	**33.4**
Minimum	"	105.6	49.2	32.0	32.0	52.3	16.8	12.5	32.2
Maximum	"	109.6	53.4	33.2	33.2	54.5	17.3	15.3	34.2

The tabulated measurements of the skulls show considerable variation in size, the total length ranging in adult males from 108.1 to 115.4 mm., and the zygomatic breadth ranging from 51.0 to 58.5 mm., all other dimensions varying proportionally. In one young adult (dentition mature), m^2 is unusually large and is inserted obliquely to the axis of m^1, instead of parallel with it, on both sides of the jaw. There are no skulls sufficiently young to show the milk dentition.

Half to two-thirds grown young have a much lighter or more grayish ground color than adults with the general effect of a greater prevalence of black, below as well as above, a condition that prevails, as already noted, in other Congo forms of *Genetta*.

The ground color varies in different specimens from yellowish white to ochraceous; it is palest on the ventral surface, being nearly white (or white with a faint yellowish wash) on the foreneck and pectoral region, where the black spots are more widely separated than elsewhere, while on the belly the black spotting greatly exceeds in area the light ground color. On the upperparts the intensely black markings considerably exceed the light interspaces, and on the middle of the back black occupies, in many specimens, a broad area in which the ground color is so restricted as to be almost entirely concealed by the profusion of black hairs, so that in general effect black greatly predominates. In other specimens the whole back is merely mottled with closely-set black spots, with enough of the ground color left to lend an ochraceous suffusion to the whole dorsal area, giving to the black markings considerable individuality. The ochraceous tone is deepest along the middle of the back, lessening in intensity on the flanks, and gradually merging into the much paler ventral surface. The pale bands on the tail, especially the proximal three or four, are more or less strongly suffused with pale yellow, the apical ones being clear white. They are usually complete rings but some are broken dorsally by black. The number varies from five to eight (Pl. XVI), but usually is either six or seven (in fifteen specimens six, in thirteen specimens seven, while one has eight and another five). In one specimen, with thick long pelage, the first four are half rings, broadly broken dorsally by black; the next two are narrow but complete, while the apical one (the seventh in this case) is so narrow as to be almost obsolete. The light rings vary in width from about one-fifth to about one-third of the breadth of the intervening black spaces. The limbs, both fore and hind, are intense black, usually paling to dark brown on the feet.

The pelage is long and thick, and when unworn the hairs on the back have a length of 30 to 40 mm., and on the tail often attain a length of 50 mm. The intensity of the broad black bands and the sharp definition of the black spots in a tawny setting render this species one of the most beautiful of mammals, especially in exceptionally high-colored examples with deep ochraceous mid-dorsal ground color.

An interesting feature, in addition to its striking coloration, its thick tail, and large size, which so markedly distinguish it from its congeners, is the presence of a nuchal crest, occasionally extending posteriorly as far as the middle of the back, but usually not beyond the shoulders. This crest is not a simple broad line of black but is composite, consisting of a narrow median line of the ochraceous ground color flanked on either side by a narrow line of black, and outside of these by two wider bands of the ground color. The hair of the outer ochraceous bands is longer and more rigid than that of the three narrower middle bands, and is directed inward and close over and more or less conceals the three middle bands; the five bands collectively form the crest and fully occupy the space between the broad black neck bands, present in most species of the genus. In "made-up" or "stuffed" skins the nuchal crest is not usually conspicuous but can be readily detected once attention has been directed to its presence, nor can its composite character be always easily made out from such material. In soft-tanned skins its whole structure and relations are perfectly evident. While what looks like a low nuchal crest is more or less obvious in most of the specimens, I did not at first give it serious attention, supposing it to be due to displacement of the pelage in the preparation of the skin, or perhaps to a fold in the skin, till my attention was especially directed to it by Mr. Lang as a distinctive feature of the species.

OSBORNICTIS J. A. Allen[1]

Osbornictis J. A. ALLEN, 1919, Journ. Mammalogy, I, No. 1, November 28, p. 25. Type, by original designation, *Osbornictis piscivora* J. A. Allen.

Skull long and lightly built; dentition of generally frailer appearance than in *Genetta victoriæ* (Figs. 23, 24), canines more curved and slender, greater diastemata between premolars, pm 2 and 3 with high trenchant central cusps, molars greatly reduced. Sagittal and lambdoid crests and postorbital processes highly developed (Figs. 21A and C). Rhinarium small, without a median sulcus. Soles and palms bare, not furred as in *Genetta* and allied genera. Color of upper side of body nearly uniform chestnut-brown; head-markings white; tail black; wholly without the black spots and bands so characteristic of the other Viverrinæ (Pl. XVIII). Habits piscivorous.

The type of *Osbornictis* agrees closely in size with *Genetta victoriæ*, the largest of the genets, with which the principal comparisons have been made.

The accompanying comparative figures of the skulls, rhinaria, and feet, render easily appreciable the important morphological differences. Attention, however, may be called to some of the cranial peculiarities of *Osbornictis* in comparison with *Genetta*, as: (1) the short extension of the premaxillæ in front of the canines (Figs. 21, 22, 23); (2) the greater lateral expansion of the braincase (Figs. 21C, 22C); (3) the great development of the postorbital processes; (4) the heavy structure and high arching of the zygomata (Figs. 21A, 22A); (5) the extreme narrowness of the palatal region (Figs. 21B, 22B); (6) the great reduction in size of the teeth and compensating increase in length of the diastemata

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[1] Named for Professor Henry Fairfield Osborn, President of The American Museum of Natural History, whose interest in the American Museum Congo Expedition contributed greatly to its success in the field and later to the early publication of its scientific results.

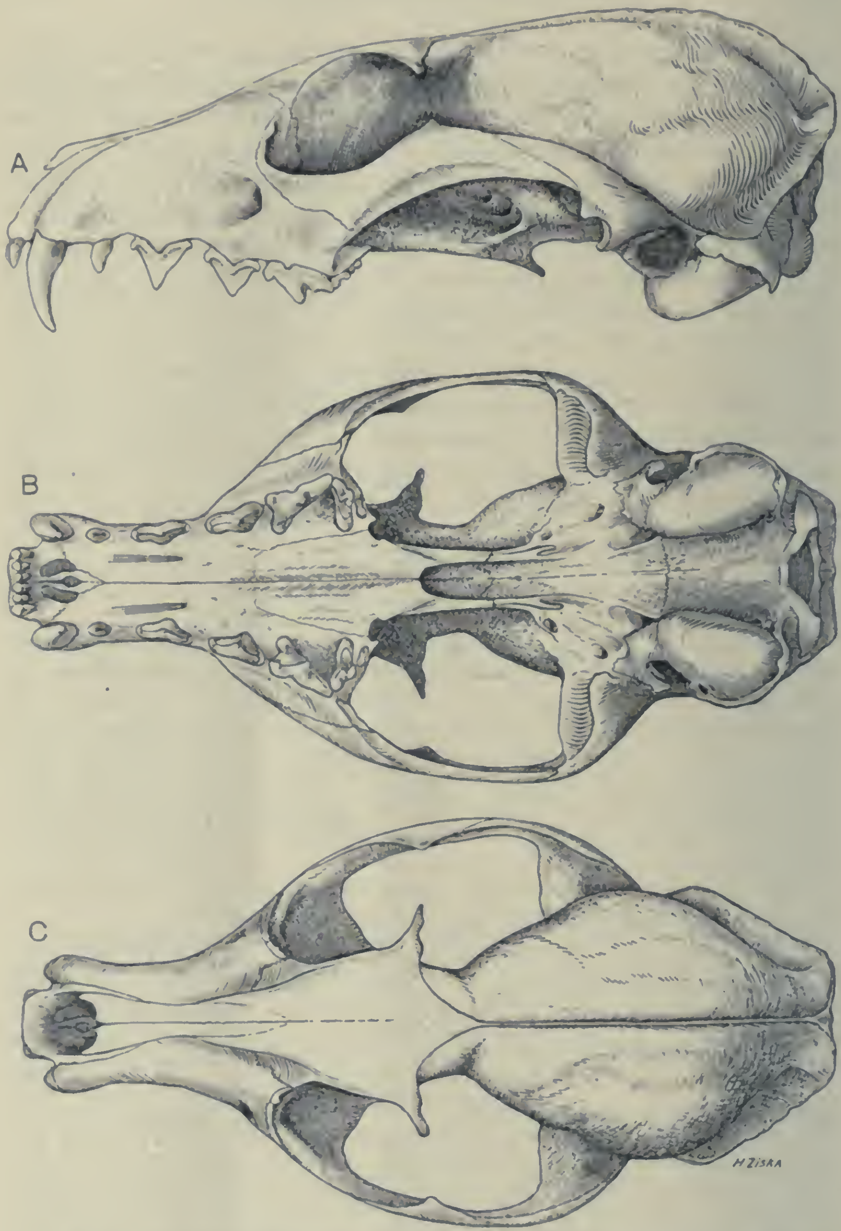

Fig. 21. *Osbornictis piscivora.* Type skull, adult male (No. 51514). A, lateral view; B, palatal view; C, dorsal view. Natural size.

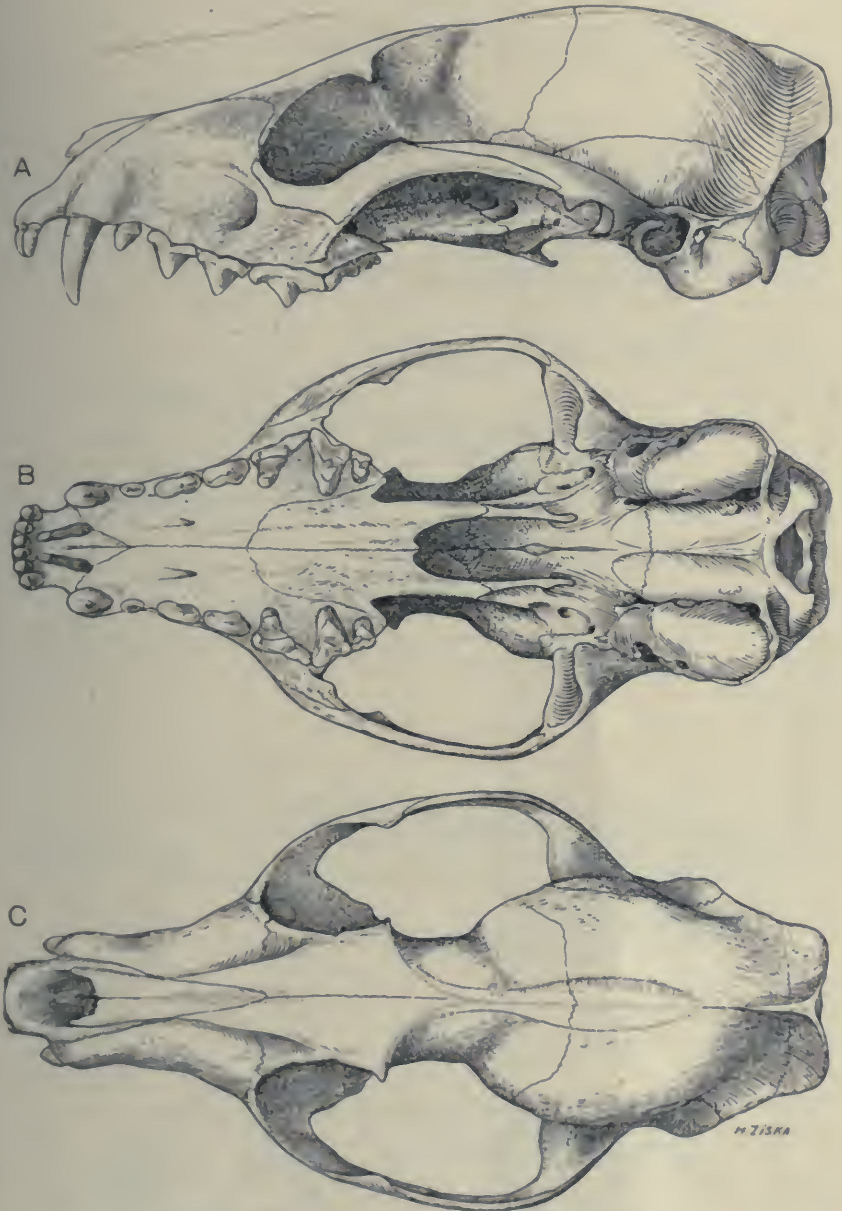

Fig. 22. *Genetta victoriæ.* Skull of adult male (No. 51430). A, lateral view; B, palatal view; C, dorsal view. Natural size.

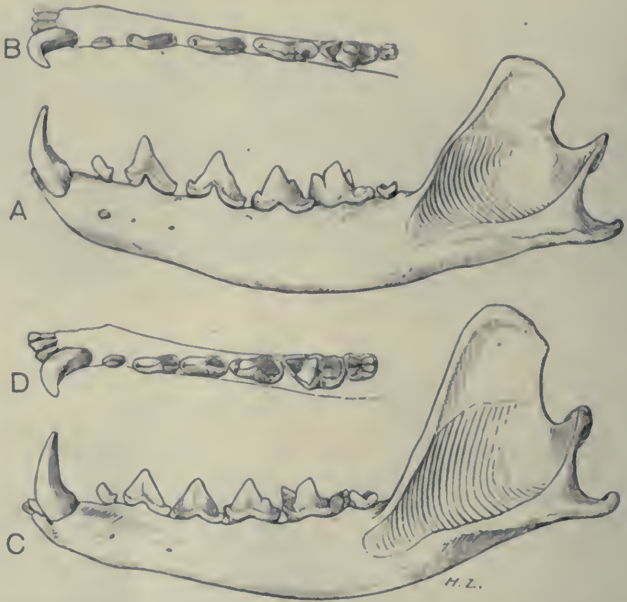

Fig. 23. A, lateral view of left mandible of *Osbornictis piscivora* (Type, No. 51514); B, crown view of left lower dentition of same; C, lateral view of left mandible of *Genetta victoriæ* (No. 51430); D, crown view of left lower dentition of same. Natural size.

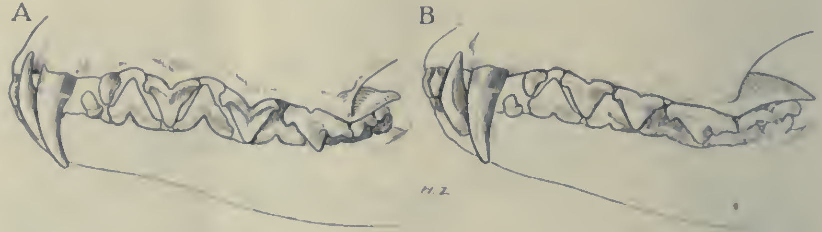

Fig. 24. Left half of dentition in occlusion. A, *Osbornictis piscivora* (Type No. 51514); B, *Genetta victoriæ*. Natural size.

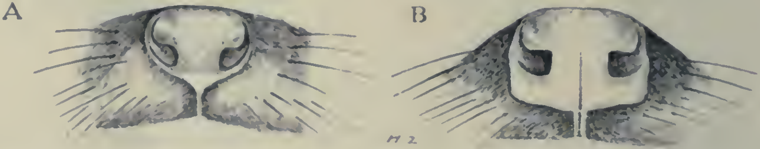

Fig. 25. Rhinarium. A, *Osbornictis piscivora* (Type, No. 51514); B, *Genetta victoriæ*. Natural size.

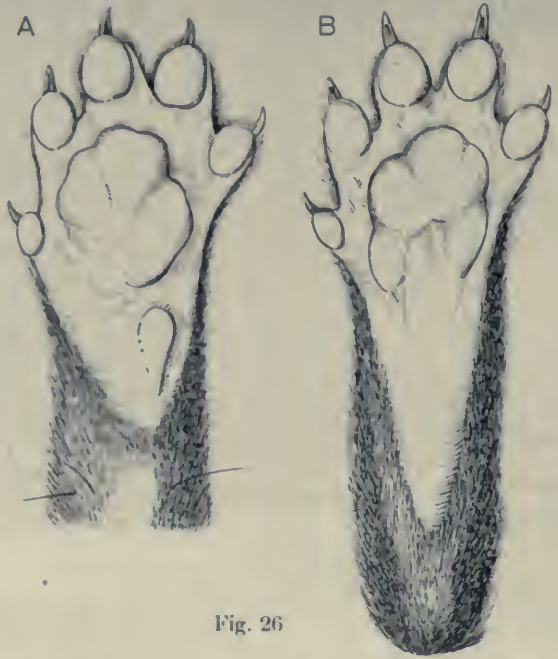

Fig. 26

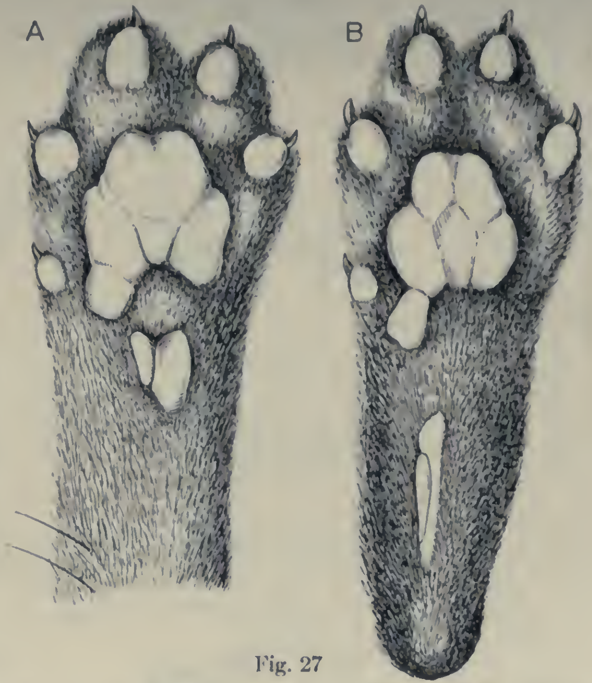

Fig. 27

Fig. 26. *Osbornictis piscivora* (Type, No. 51514). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.
Fig. 27. *Genetta victoriæ* (No. 51419). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

(Figs. 21A-B, 22A-B, 23, 24); (7) slenderness of mandible and reduced size of coronoid process (Figs. 23A and C). Further may be noted (8) the small size of the rhinarium and absence of a median sulcus (Figs. 25A and B); (9) the naked palms and soles (Figs. 26 and 27); and (10) the abbreviated rostrum—adaptive characters correlated with piscivorous habits, further specialized in the Lutrinæ.

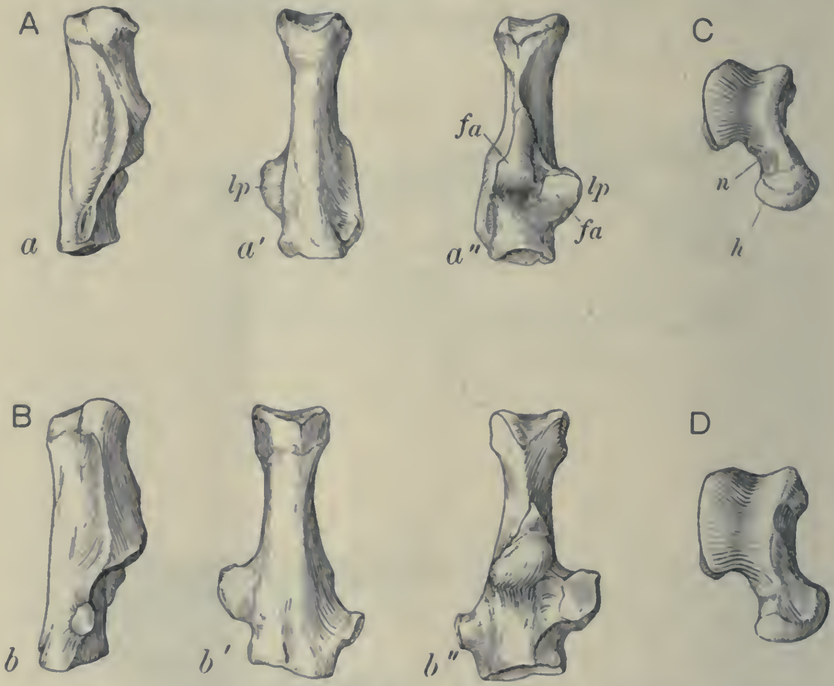

Fig. 28. Comparative views of right calcaneum of: A, *Osbornictis piscivora* (*a*, external lateral view; *a'*, plantar surface; *a''*, dorsal surface); and B, *Genetta victoriæ* (*b*, external lateral view; *b'*, plantar surface; *b''*, dorsal surface). Comparative views of dorsal surface of right astragalus of: C, *Osbornictis piscivora;* and D, *Genetta victoriæ*. ×3/2.

fa, facet for articulation with astragalus; *h*, head; *lp*, lesser process; *n*, neck.

Osbornictis piscivora J. A. Allen

Plates XVIII, XIX; and Text Figures 21, 23A and B, 24A, 25A, 26, 28A and C, 29A and C, 30A, 31A, 32A, 33A

Osbornictis piscivora J. A. Allen, 1919, Journ. Mammalogy, I, No. 1, November 28, p. 25.

Type, No. 51514, ♂ adult, Niapu, Belgian Congo, December 1, 1913; Herbert Lang and James P. Chapin, American Museum Congo Expedition. Orig. No. 2147. Skin and complete skeleton.

External measurements about as in *Genetta victoriæ* Thomas, but soles and palms naked (Fig. 26), and coloration radically different; skull lighter built, dentition weaker, but generally sharper-edged (Figs. 21A, 23).

Upperparts of body uniform dark chestnut-brown (Pl. XVIII), with much darker median dorsal stripe; the chestnut-brown, in reduced intensity, extends over the underparts from the pectoral region to the base of the tail, lightening to dull red mesially with a slight mixture of whitish hairs along the midline of abdomen; head from muzzle posteriorly, and laterally to the eyes, pale fuscous brown with a tinge of reddish, broken by a pair of elongated spots of clear white between the eyes divided by a narrow fuscous band, and a narrower, more indistinct posterior pair between the anterior base of the ears; a narrow dark eye-ring; front and sides of muzzle and sides of head below eyes whitish, intensified to a clear white spot just below the anterior two-thirds of each eye; ears exteriorly blackish, which color extends mesad over the lateral third on each side of the crown; ears nearly naked internally and edged with long whitish hairs; chin and throat white, passing into brownish posteriorly with

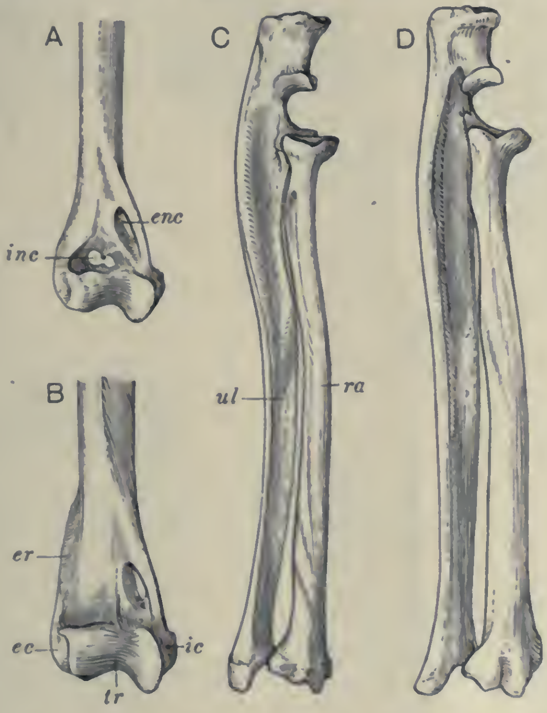

Fig. 29. A, Anterior view of distal portion of right humerus of *Osbornictis piscivora* (Type, No. 51514); B, the same of *Genetta victoriæ* (No. 51406); C, external view of right radius and ulna of *O. piscivora;* D, the same of *G. victoriæ*. Natural size.

ec, external condyle; *enc*, entepicondylar foramen; *er*, ectocondylar ridge; *ic*, internal condyle; *inc*, intercondylar foramen; *ra*, radius; *tr*, trochlea; *ul*, ulna.

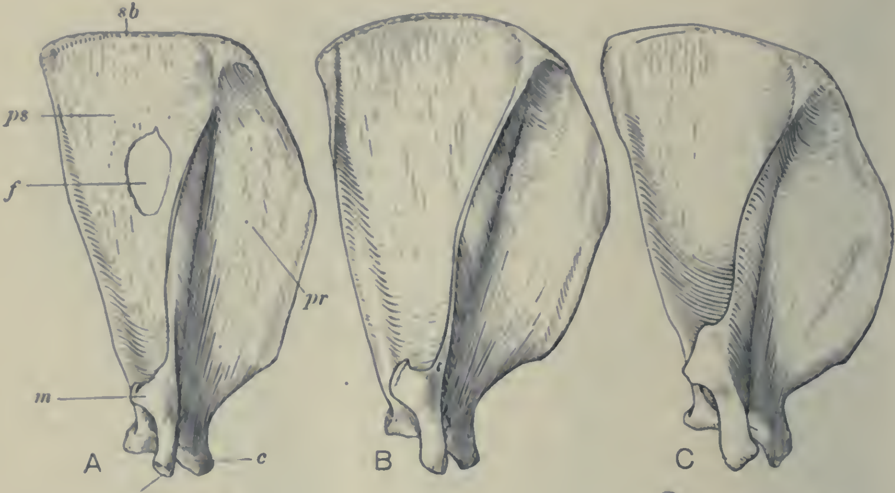

Fig. 30

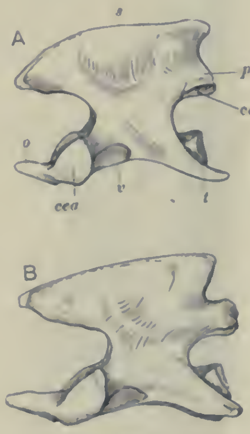

Fig. 31

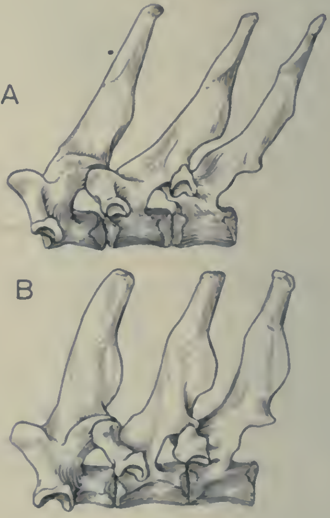

Fig. 32

Fig. 30. External view of right scapula of: A, *Osbornictis piscivora* (Type, No. 51514; terrestrial; piscivorous); B, *Genetta victoriæ* (No. 51406; partly terrestrial, partly arboreal; carnivorous); and C, *Nandinia binotata* (No. 51469; chiefly arboreal, excellent climber; carnivorous and partly vegetable feeder). Natural size.

ac, acromion; *c*, coracoid; *f*, fenestra; *m*, metacromion; *pr*, prescapular fossa; *ps*, postscapular fossa; *sb*, suprascapular border.

Fig. 31. Left lateral view of axis. A, *Osbornictis piscivora* (Type, No. 51514); and B, *Genetta victoriæ* (No. 51406). Natural size.

ca, caudal articular surface; *cea*, cephalic articular surface; *o*, odontoid process; *pz*, postzygapophysis; *s*, spinous process; *t*, transverse process; *v*, vertebrarterial canal.

Fig. 32. Left lateral view of first three dorsal vertebræ. A, *Osbornictis piscivora* (Type, No. 51514); B, *Genetta victoriæ* (No. 51406). Natural size.

scattered whitish hairs on the foreneck; tail entirely without annulations, heavily clothed with long black hairs, 45–50 mm. in length, the heavy underfur pale brownish gray, about 25–30 mm. in length; fore and hind limbs dark, slightly rufescent brown, passing into blackish brown on upper surface of feet.

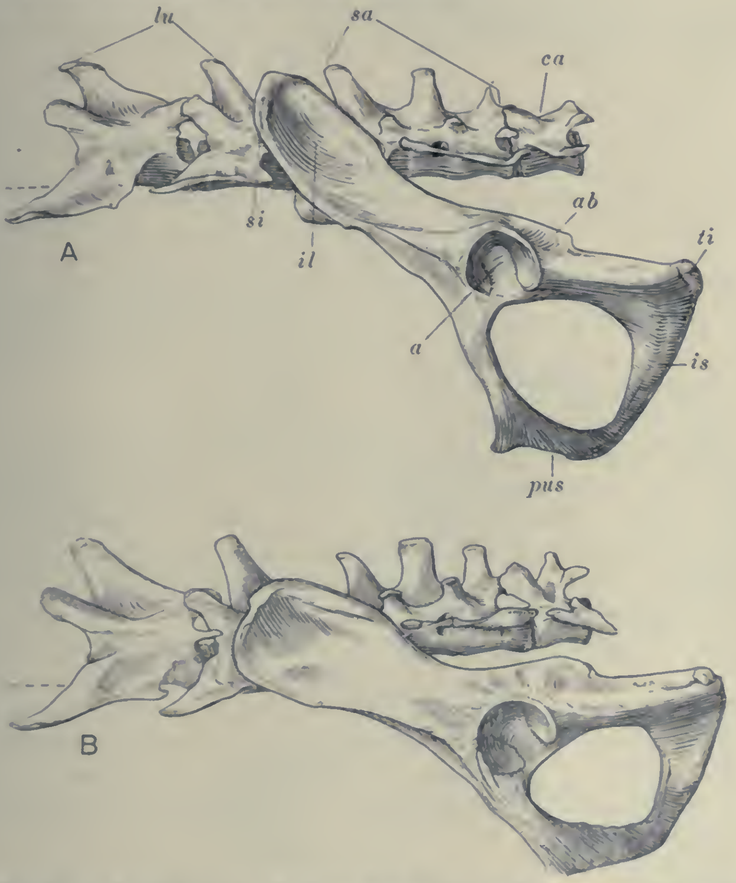

Fig. 33. Left lateral view of pelvic region with the last lumbar, the sacral and the first caudal vertebræ in place. A, *Osbornictis piscivora* (Type, No. 51514); B, *Genetta victoriæ* (No. 51406). Natural size.

a, **acetabulum;** ***ab***, **acetabular border;** ***ca***, **first caudal vertebra;** ***il***, **iliac surface;** ***is***, **ischial region;** ***lu***, **last lumbar vertebræ;** ***pus***, **pubic symphysis;** ***sa***, **sacral vertebræ;** ***si***, **suprailiac border;** ***ti***, **tuberosity of ischium.**

Rhinarium (Fig 25A) similar in contour to that of *Genetta victoriæ* (Fig. 25B), but about one-half smaller. Soles and palms (Fig. 26) naked, the pads not enclosed nor separated by dense fur, as in *Genetta* (Fig. 27) and *Civettictis* (Fig. 15), with the carpal pad greatly elongated as in *Viverricula*. Pelage long and dense, that of the tail especially so, its tail equal in size to that of the most heavy-tailed examples of *G. victoriæ*.

Represented by the adult male type (skin and complete skeleton) and an imperfect native-made skin (without skull, feet, or tail), from neighborhood of Bafwabaka, similar to the type in coloration, length of body, and in head-markings, except that the latter are yellowish through staining instead of white.

Collectors' measurements : Total length, 910 mm. (about the average for *G. victoriæ*); head and body, 495; tail vertebræ, 415; hind foot, 90; ear, 41.

Skull, greatest length, 108.8 (113.7)[1]; condyloincisive length, 105 (110); palatal length, 51.9 (52.9); maxillary toothrow (p^1-m^2), 36.8 (36.0); zygomatic breadth, 54.5 (56.8); least interorbital breadth, 15.4 (18.2); least postorbital breadth, 13.1 (14.2); across postorbital processes, 30.6 (24.8); breadth of braincase, 35 (33.8); palatal breadth (outside to outside of posterior edge of p^4), 28.6 (32.9); breadth of rostrum at p^1, 16.2 (17.9); breadth of mesopterygoid fossa, outside, 8.1 (12); incisive breadth (base of incisors), 8.0 (10.2); breadth at base of canines, 16.8 (19); greatest (oblique) length of p^4, 10.1 (10.7); greatest breadth of p^4, 5.2 (6.2); greatest breadth (transverse) of m^1, 7.1 (8.9); m^2, 2.3×1.1 (5.0×3.1); length of mandibular ramus (symphysis to posterior border of condyle), 75 (75); angle to coronoid, 25.4 (28.8); length of toothrow p_1-m_2, 40.3 (39); m_2, length 2.7× width 2.4 (5.1×3.9).

It is similar in skeletal characters to *Genetta victoriæ*, except that the bones are slenderer. The linear measurements of the limb bones are practically the same in *Osbornictis* and *G. victoriæ* in adult male skeletons of comparable ages, but the bones are far more massive in the latter, or about one-third heavier (Fig. 29). The same is true of the ribs and vertebræ (Figs. 31, 32, 33). The scapula (Fig. 30), atlas and pelvis (Fig. 33) are especially weak in *Osbornictis* in comparison with *G. victoriæ*. The scapula of *Osbornictis* is light and thin with large vacuities in both the pre- and postscapular fossæ, with translucent adjoining areas due to the thinness of the bone. The zygapophyses of the atlas also have similar translucent areas. *Osbornictis* has twelve pairs of ribs and twenty-five caudal vertebræ, *G. victoriæ* thirteen pairs of ribs and twenty-six caudal vertebræ. The number might vary, however, in other individuals of either species.

POIANA Gray

Poiana GRAY, 1864, Proc. Zoöl. Soc. London, p. 520, figs. (p. 521, skull). Type, by monotypy, *Linsang richardsoni* Gerrard.

Poiana richardsoni ochracea Thomas and Wroughton

Plates XVII, Figure 2; XX, Figure 1; and Text Figures 20C, 34, 35

Poiana richardsoni ochracea THOMAS AND WROUGHTON, 1907, Ann. Mag. Nat. Hist., (7) XIX, May, p. 372. Type locality, near Yambuya, Aruwimi River, Belgian Congo. Type a flat skin without skull.

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[1] The measurements in parentheses are of a large male of corresponding age (No. 51432) of *Genetta victoriæ*, for comparison.

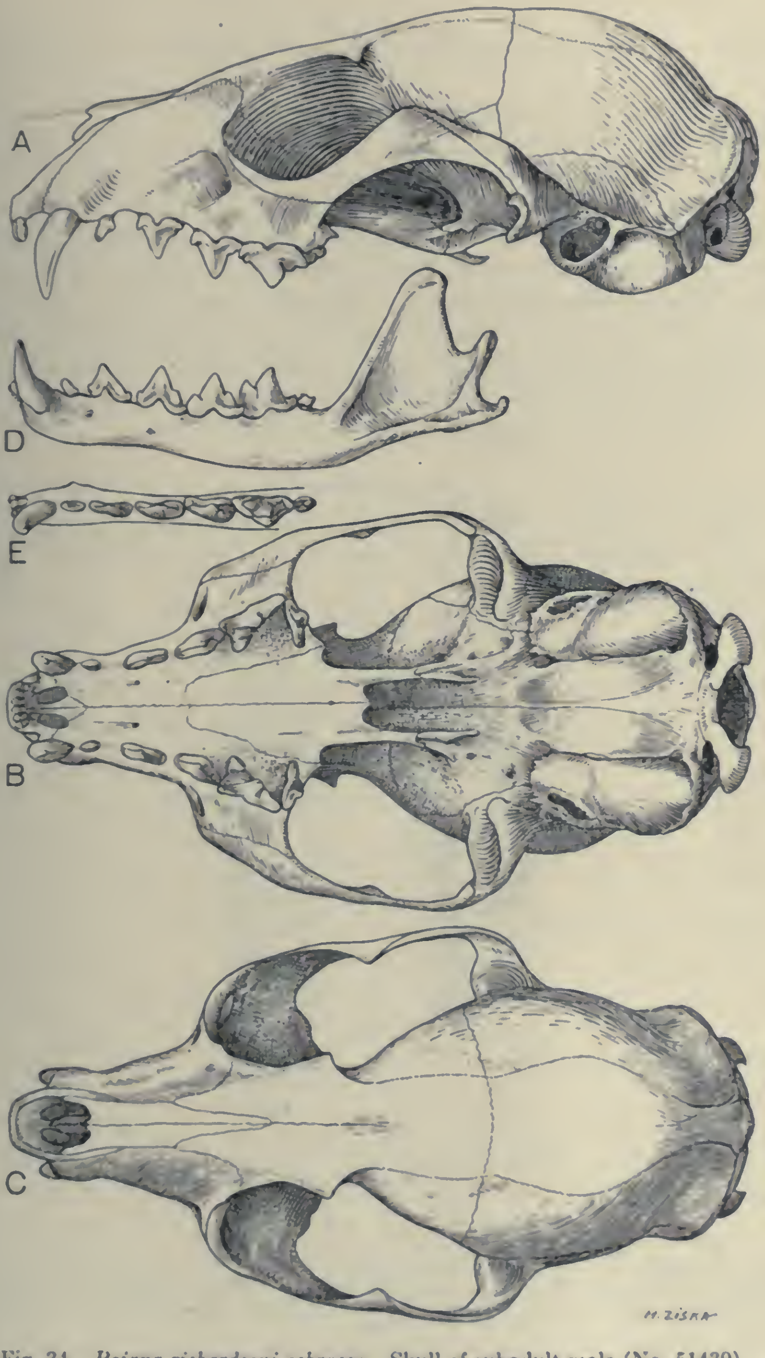

Fig. 34. *Poiana richardsoni ochracea.* Skull of subadult male (No. 51439). A, lateral view; B, palatal view; C, dorsal view; D, lateral view of left mandible; E, crown view of left lower dentition. × ⅔.

Represented by four males, taken as follows:

Akenge, 1; October 25, 1913.

Niapu, 1; November 11, 1914.

Medje, 2; March 8, 1910; April 3, 1914.

The Niapu specimen is young, still retaining the entire milk dentition, but the crown of the first molar is breaking through the gum. One of the Medje specimens is fully adult; the other has acquired the permanent dentition, but the canines are only half-grown, and the milk canines are still present at the posterior base of their successors. The skull of the Akenge specimen is figured (Fig. 34).

Collectors' measurements of the 4 specimens:

Cat. No.	Sex and Age	Locality	Total Length	Head and Body	Tail	Hind Foot	Ear
51438	♂ adult	Medje	712	332	380	64	36
51441	♂ juvenile[1]	"	685	330	355	61	36
51440	♂ juvenile[2]	Niapu	588	288	300	53	31
51439	♂ juvenile[3]	Akenge	695	321	374	62	33

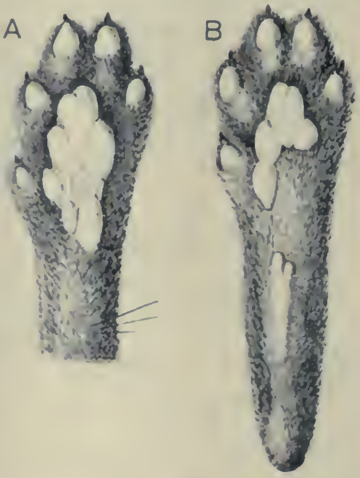

Fig. 35. *Poiana richardsoni ochracea* (No. 51439). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

The two skulls from Medje measure as follows: Condyloincisive length, ♂ adult 65.2, ♂ subadult 62.7; palatal length, 31.7, 28.7;

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[1] Full permanent dentition present, but milk canines not shed.
[2] Milk dentition fully present, first molar breaking through the gum.
[3] Subadult.

maxillary toothrow (p^1-m^1), 19.4, 19.2; palatal breadth (outside to outside of p^4), 18.5, 18.0; zygomatic breadth, 34.1, 31.3; least interorbital breadth, 10.3, 8.4; least postorbital breadth, 13.9, 11.3; greatest breadth of braincase, 24.5, 23.7.

These four specimens agree well in coloration with the description of the type of *ochracea*, a flat skin without skull, from Yambuya, Aruwimi River,[1] stated by Pocock[2] in 1907 to be the only known specimen of the subspecies. They vary somewhat in coloration, the two from Medje and the Niapu specimen having the ground color much deeper and more rusty yellow than the specimen from Akenge (Pls. XVII, fig. 2 and XX, fig. 1).

NANDINIA Gray

Nandinia Gray, 1843, 'List of Specimens Mamm. Brit. Mus.,' pp. xx, 54; 1864, Proc. Zoöl. Soc. London, p. 529. Type, by monotypy, *Viverra binotata* Gray.

Nandinia binotata (Gray)

Plates XX, Figure 2; XXI; and Text Figures 30C, 36–38

Viverra binotata Gray (ex Reinwardt, Ms.), 1830, 'Spic. Zoöl.,' II, p. 9. Type locality, Ashanti, Africa.

Nandinia binotata Gray, 1843, 'List of Specimens Mamm. Brit. Mus.,' p. 54; 1864, Proc. Zoöl. Soc. London, p. 530.

Nandinia binotata Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Medje (2), Poko (9 specimens).

Represented by 73 specimens (30 ♂, 43 ♀, of which 59 are adult and 14 juvenile), collected as follows:

Niangara, 6 (1 ♂, 5 ♀), November 9–21, December 8, 9, 1910; May 14, 1913.

Poko, 1 (♀ adult), August 29, 1913.

Akenge, 15 (7 ♂, 8 ♀), September 30, October 3–31, 1913.

Niapu, 30 (13 ♂, 17 ♀), November 1–30, December 1–28, 1913; January 2, 22, 1914.

Medje, 20 (8 ♂, 12 ♀), January 24, March 9, 17, April 1, May 1–19, June 8, August 19, 22, September 10, 15, 23, 29, 1910.

Boyulu,[3] 1 (♂ adult), September 22, 1909.

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[1] "A flat skin, obtained from a native who was wearing it on a belt and was going to make a pouch of it for holding pipe and tobacco. We noticed that it was a new skin to us, and exchanged it for a few pinches of salt."—Note by R. B. Woosnam, the collector of the specimen, in Thomas and Wroughton's report on the mammals of the Ruwenzori Expedition (1910, Trans. Zoöl. Soc. London, XIX, pt. 5, March, p. 495).

[2] 1907, Proc. Zool. Soc. London, II, May, p. 1044.

[3] About 45 miles southwest of Avakubi.

Collectors' measurements of 18 adult specimens (7 males, 11 females) from Niapu:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	1081(1035–1110)	510(475–570)	570(535–610)	92(84–100)	38.4(37–40)
♀	1014(965–1092)	480(440–515)	544(520–590)	88(82– 96)	36.4(35–39)

Collectors' measurements of 12 adult specimens from Akenge and of 11 from Medje:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot
7 ♂, Akenge:	1026(920–1135)	483(450–530)	542(465–617)	95.3(90–102)
5 ♀, "	1024(980–1100)	491(465–537)	529(494–563)	93.6(88– 97)
3 ♂, Medje:	1051(1032–1060)	492(467–515)	562(545–575)	92.7(90– 98)
8 ♀, "	1038(970–1100)	481(440–510)	556(530–600)	92.0(90– 95)

Measurements of Eight Adult Male and Ten Adult Female Skulls of *Nandinia binotata* from Niapu

Cat. No.	Sex and Age	Condylo-incisive Length	Palatal Length	Palatal Breadth (outside to outside of p^4)	Maxillary Toothrow (p^1-m^2)	Zygomatic Breadth	Tip to tip of Postorbital Proc.	Breadth Braincase
51487	♂ old	100.9	46.4	32.6	29.4	60.0	28.0	33.8
51491	♂ "	96.7	44.7	29.4	28.2	52.8	23.2	32.3
51497	♂ "	100.5	45.7	30.0	30.0	56.0	27.6	33.3
51504	♂ "	97.4	45.7	28.7	27.9	53.6	30.2	31.5
51506	♂ ad.	94.6	45.4	27.7	28.5	53.8	26.7	31.9
51507	♂ old	105.1	48.7	32.1	30.6	59.8	28.2	32.2
51508	♂ ad.	97.6	43.9	30.6	27.8	58.7	——	32.1
51512	♂ old	100.0	48.0	31.6	28.8	58.6	30.8	31.7
Average	**8 ♂**	**99.1**	**46.1**	**29.1**	**28.9**	**56.8**	**27.5**	**32.4**
Minimum	"	94.6	43.9	27.7	27.8	52.8	23.2	31.5
Maximum	"	105.1	48.7	32.6	30.6	60.0	30.8	33.8
51492	♀ ad.	99.4	42.2	28.0	26.5	50.8	24.4	31.0
51493	♀ old	92.0	41.6	29.7	27.5	50.8	25.7	30.4
51494	♀ "	96.8	45.7	29.2	29.3	53.7	30.4	29.6
51495	♀ "	91.3	43.1	30.6	27.9	52.3	28.7	31.8
51500	♀ ad.	93.5	43.4	29.3	27.5	50.0	23.1	30.4
51501	♀ old	98.7	47.3	30.5	30.0	52,9	27.3	29.8
51505	♀ ad.	97.4	43.9	29.5	27.0	51.9	26.9	32.0
51509	♀ "	95.7	45.2	27.8	28.0	——	——	30.8
51510	♀ "	91.2	41.5	30.2	27.7	52.9	28.9	32.5
51513	♀ old	93.7	43.7	29.0	28.1	54.2	28.0	31.8
Average	**10 ♀**	**95.0**	**43.8**	**29.4**	**28.0**	**52.2**	**27.0**	**31.0**
Minimum	" "	91.2	41.5	27.8	26.5	50.0	23.1	29.6
Maximum	" "	99.4	47.3	30.6	30.0	54.2	30.4	32.5

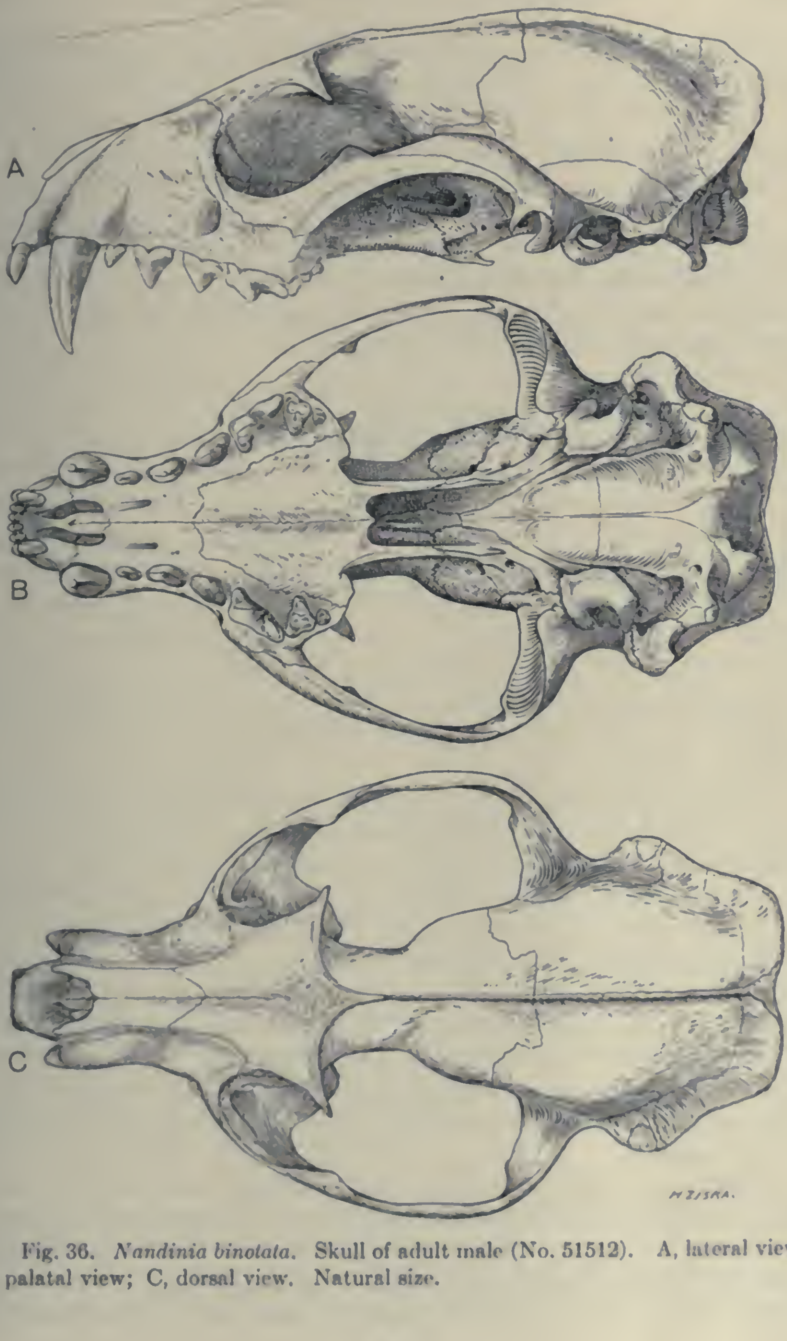

Fig. 36. *Nandinia binotata.* Skull of adult male (No. 51512). A, lateral view; B, palatal view; C, dorsal view. Natural size.

Measurements of ten adult skulls from Akenge and of six from Medje:

	Condylobasal Length	Zygomatic Breadth
4 ♂, Akenge:	97.1 (93.5–102.5)	55.9 (50.7–62.6)
6 ♀, "	95.8 (92.6– 98.7)	51.2 (47.2–56.2)
2 ♂, Medje:	101.3 (94.9–107.6)	55.3 (54.9–55.7)
4 ♀, "	93.2 (90.6– 94.7)	56.5 (49.0–53.9)

Males average slightly larger than females but, as the range of individual variation is twice that of the average sexual difference, size cannot be taken as diagnostic of sex.

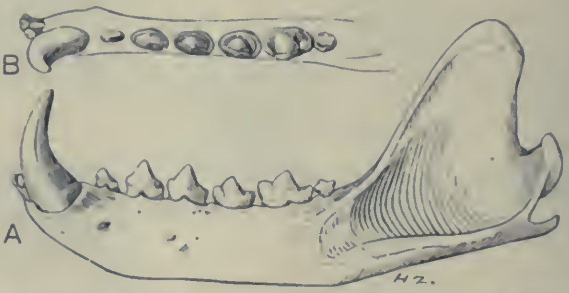

Fig. 37. *Nandinia binotata.* Adult male (No. 51512). A, lateral view of left mandible; B, crown view of left lower dentition. Natural size.

The small peg-like m² is often absent in specimens past middle age, one or both (usually both) having been lost in about 50 per cent of the older skulls, in most instances leaving no indication of its former presence.

A series of ten young skulls shows that the first premolars do not appear above the gums till the milk teeth are fully mature, and have no successors, being permanent teeth. Quite an interval elapses after the maturity of the deciduous dentition before the first molar shows any indication of breaking the alveolus. The postorbital processes, and coincidently of course the postorbital constriction, take form before any of the deciduous premolars are through the gum, whereas in *Genetta* these features are not indicated till about the time the milk teeth have reached full development.

Skulls in which only mature milk teeth are present have a total length of about 67 to 70 mm., a zygomatic breadth of 36 to 38 mm., and a breadth of braincase of 29 to 30 mm. Those in which the first milk premolars are piercing the gum have a total length of about 10 mm. less (56–58 mm.), with other dimensions proportionate, while those in which the first molars (m^1 m_1) are breaking through the gum are about 10 mm. longer than the first mentioned, the skull length increasing from about 56 mm. to about 80 mm. during the development of the milk teeth.

The present collection of nearly seventy-five specimens, representing three localities by series of fifteen, twenty and thirty each, shows that there is a wide range of individual variation in coloration in *Nandinia* as well as in the genets, especially among adults. Young in the nursling stage—in the woolly first coat with the milk teeth still enclosed in the gum—indicate less difference in coloration between the first and later pelages than is the case with some of the genets. The pattern is like that of adults but the black markings are duller and less sharply defined and the ground color is much paler, being grizzled pale brown varied conspicuously with whitish-tipped hairs above and with pale fulvous below—not dull, dingy gray, as in the *Genetta pardina* group. The light tail-rings, however, are not very unlike those in adults, being pale rusty-buff, and are similarly variable in number and character. The pair of light shoulder spots is present but less prominent and paler than in older specimens (Pls. XX, fig. 2 and XXI, fig. 2). The series of fourteen young, ranging in age from nurslings to subadult, present a very uniform general tone of coloration, the underparts being yellowish-washed and the ground color of the upperparts varying from grayish brown to pale reddish brown or "wood brown." The range of variation is, in general effect, much less than among adults. They merge in coloration into the series of adults without break in the transition at any stage.

The extreme phases in adults are, for the ground color of the upperparts, gray faintly suffused with pale buff to ochraceous tawny, and for the underparts from pale ochraceous buff to dull tawny olive. In the former the light shoulder spots are pale yellowish white, in the latter rich ochraceous buff. The black neck-bands vary greatly in breadth and distinctness; the median one is usually broad and heavy, much broader than the lateral ones, but sometimes is reduced to a narrow line; the lateral bands are sometimes nearly as broad and heavy as the median band, but often are very narrow, irregular or more or less broken, and inconspicuous (Pl. XXI, fig. 1). In none are the neck-bands wholly absent, as in *N. gerrardi* Thomas.

The black annulations on the tail are exceedingly unstable as to number, the completeness of the rings, and distances apart. For the proximal fourth of the tail they are often reduced to pairs of lateral spots, but occasionally these spots are joined dorsally and ventrally and thus form complete rings. On the middle of the tail the rings are usually complete but vary in width, sometimes being more than half as broad as the brown interspaces; often they have the character of partly coalesced double or even triple rings. Rarely they are rather evenly distributed from the base to near the tip of the tail, and vary in number in different specimens from about twelve to fifteen. On the apical third of the tail the rings are usually nearly obsolete or very irregular and lose their distinctness as rings, forming irregular spots and blotches rather than annulations. The irregularities are so great that their number and character fail to be of diagnostic value.

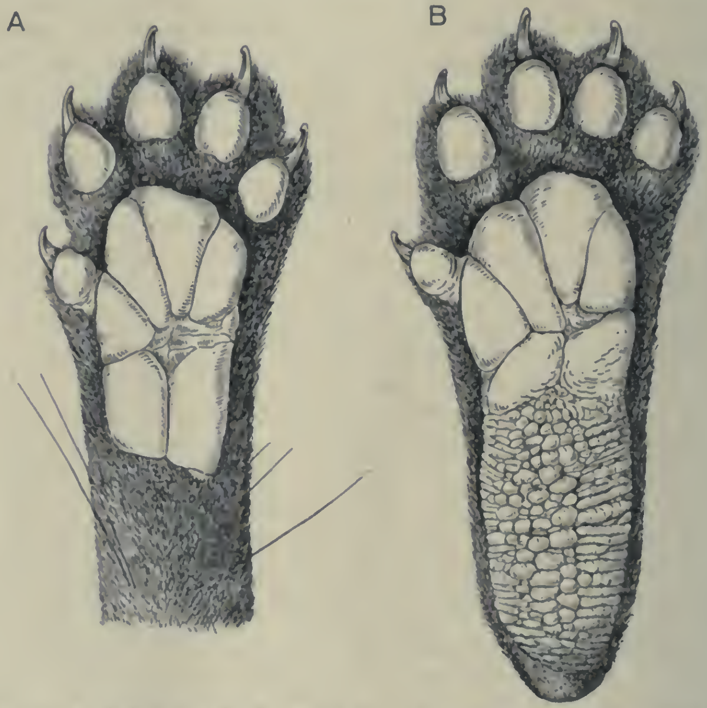

Fig. 38. *Nandinia binotata* (No. 51504). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

Nandinia binotata arborea Heller proves on comparison with the Congo series to be surprisingly different, through its pale general coloration, both above and below, the relative indistinctness and reduced size of the dark markings and much heavier tail. It seems to form a distinctly intermediate stage between *N. binotata* and *N. gerrardi*, but not intimately related to either.

Herpestinæ[1]

The Herpestinæ are represented in the present Congo Collection by nine genera (*Herpestes, Galerella, Helogale, Mungos, Crossarchus, Ichneumia, Xenogale, Atilax* and *Bdeogale*) and ten species. Of these, one genus and three forms are new. The total number of specimens is 169.

On taking up the study of the large collection of mongooses obtained by The American Museum Congo Expedition, it soon became evident that a number of complicated questions of nomenclature required careful consideration, as well as others of a taxonomic character. As in some instances several generic groups are involved in a single inquiry, it has seemed better to present the results collectively as introductory matter than to scatter them at intervals through the systematic list of the species. It has also seemed desirable to present not only the results, but to indicate rather fully the premises on which the conclusions rest, even at the risk of incurring the charge of prolixity. Heretofore results of such investigations have often been given without much information as to how they were obtained. A notable case is that of the substitution, about a decade since, of *Mungos* for *Herpestes*, and the abrupt relegation of the latter to synonymy.

Our most serious nomenclatural problems usually have their origin in the methods and imperfect knowledge of the pioneers in natural history, and the carelessness of subsequent compilers, striking examples of which are shown below, notably in the confusion of the two totally different Vansires, the first described by Buffon and Daubenton (1765), the second by F. Cuvier (1826). The genera especially considered below, from a nomenclatural point of view, are *Mungos, Herpestes, Atilax*, and *Ariela;* from a taxonomic point, *Crossarchus* and *Galerella*. Also the specific names *mungo* and *fasciatus*, and the notorious composite known in the literature of mammalogy as "*Mustela galera* Erxl."

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[1] Pocock, in 1916, in a paper entitled 'On the External Characters of the Mongooses (Mungotidæ)' raised the mongoose group to the rank of a family, Mungotidæ (1916, Proc. Zoöl. Soc. London, I, pp. 349–374, Figs 1–10) without giving his reasons for this action. In 1919, in his paper 'The Classification of the Mongooses (Mungotidæ),' he took occasion (1919, Ann. Mag. Nat. Hist., (9) III, June, pp. 515–524) to do this, as well as for his giving generic rank to *Atilax, Ichneumia*, and *Ariela* in his former paper. While he may be quite justified in assigning family rank to the mongooses, I prefer for the present to consider them a strongly specialized subfamily of the Viverridæ. There nevertheless remains a nomenclatural point to be considered. A few months after Pocock's last cited paper appeared I published my note, written some two years before, on 'The Generic Names *Mungos* and *Herpestes*' (1919, Journ. Mammalogy, I, No. 1, November 28, pp. 27–31), showing that both names were tenable, since although *Mungos* was the earlier name it in no sense replaces *Herpestes*. Pocock, in defending his new family name Mungotidæ says (*loc. cit.*, p. 515, footnote): "But since *Herpestes*, being preoccupied, no longer stands for the typical mongooses, *Mungos* is used instead. Similarly, Mungotinæ has taken the place of Herpestinæ." For my part I cannot see why the name Herpestinæ, dating from Gray, 1869, should give place to Mungotinæ, dating from Pocock, 1916.

La Mangouste of Buffon and Daubenton[1]

The introduction of the name Mangouste into natural history literature dates from the publication of Volume XIII of Buffon's 'Histoire naturelle, générale et particuliére, avec la description du Cabinet du Roi,' in 1765. The generalities of the subject were written by Buffon and the descriptions of the species by Daubenton, who doubtless was the supervisor of the preparation of the plates. In the present instance all the then known animals now called mongooses were included under "La Mangouste" by Buffon,[2] who believed there was only one species, and that the different kinds recognized by previous authors were merely varieties of it. The name mangouste was invented by Buffon, who thus explains its etymology in a footnote to the title of the article: "Mangouste, mot dérivé de *Mangutia*, nom de cet animal aux Indes." Buffon's contribution of ten pages of text is a summary and criticism of what had been written by previous authors about these animals; Daubenton's two pages contain a very good description of the banded mongoose of Africa, based on a stuffed skin; the accompanying plate, he states, was made from a living specimen received from M. le Chevalier d'Arcy, but no indication is given as to where this or any of the several other specimens he mentions having seen were obtained. On Daubenton's contribution hinges the settlement of various important questions of nomenclature.

Linnæus, in the 1758 edition of his 'Systema Naturæ' (I, p. 43) instituted the genus *Viverra*, with five species, belonging to the two families Viverridæ and Mustelidæ of later authors, of which three species pertain to the former and two to the latter. All the five species were composite, but they have since been resolved into their specific elements and the original names in each case conserved for one of them. All the references to mongooses were originally placed under the first species, *Viverra ichneumon*, based primarily on the ichneumon of Egypt, for which this specific name is properly retained. No material change was made in the 1766 edition of this work (I, p. 63), all the citations being the same as in the 1758 edition, except that the question was raised as to whether the *mungo* of India might not be a different species from the Egyptian *ichneumon*.[3]

The next work of nomenclatural importance in this connection is Gmelin's edition of the Linnean 'Systema Naturæ,' the first volume of which, containing the mammals, was published in 1788, in which (pp. 84–86) five species of mongoose were recognized, the second of which, *Viverra mungo*, is the only one especially related to the present discussion. *Viverra mungo*, although composite, was primarily based on the banded mongoose of Africa, although its habitat is given as India,[1] and references to various Asiatic species are included in the citations of authors under this name. As no diagnosis is given by which the species can be recognized it must be determined by the first identifiable reference. The first, it happens, is "Schreber Säugthiere, III. p. 430. t. CXVI. A. CXVI. B." Schreber's plate CXVI is an accredited copy of Buffon's figure of "La Mangouste."[2] Buffon and Daubenton supposed that their specimens came from India, but as already stated, no definite place of origin is given for any of the several specimens mentioned by them. Hence for many years Buffon's "La Mangouste" was believed to be an Indian species. For nearly a century, however, it has been recognized that Daubenton's plate and description were really based on the banded mongoose of Africa, currently known in technical literature as *Crossarchus fasciatus* (Desmarest).

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[1] This discussion was published in part under the caption 'The Generic Names *Mungos* and *Herpestes*,' 1919, Journ. Mammalogy, I, No. 1, November 28, pp. 27–31.

[2] *Loc. cit.*, XIII, pp. 150–159 (by Buffon), pp. 160–162, Pl. xix (by Daubenton).

[3] "Mungo *β simillima minor, glauca; an specie diversa?*"

In 1803 E. Geoffroy, in his 'Catalogue des Mammifères du Museum nationale d'Histoire naturelle' (Paris), redescribed "La Mangouste" of Buffon and Daubenton *from the specimen which served as the basis of the original description*, under the designation "La Mangouste de l'Inde. *Ichneumon mungo*," giving the distinctive characters as "Pelage varié de roux et de noir, par zones transversales; queue pointue; pieds pentadactyles." Among his citations are "La Mangouste, Buff. Daub. t. 13, pp. 150–160, pl. 19"; "*Viverra mungo*, Schreber, tabl. 116"; "*Viverra mungo*, Lin. Gmel., p. 84, pl. 7." Then follows a detailed description, the "patrie" ("Les indes orientales"), the number of the specimen in the catalogue of the Museum ("No. CCXXIV"), followed by the remark: "Individu qui a servi de sujet pour la descript. précédente, et celle de Buffon." The identity of the original La Mangouste is thus thoroughly established.

Desmarest (1820, 'Mammalogie,' I, p. 211) gave essentially the same description, based doubtless on the original type-specimen, under the names "Mangouste à bandes, *Herpestes mungo*." Three years later (1823, 'Dict. Sci. Nat.,' XXIX, p. 58) he changed the technical name to *Herpestes fasciatus*, because the name *mungo* was not "classical." He repeats the geographical error: "La mangouste à bandes est particuliére à l'Inde." Fischer (1829, 'Syn. Mamm.,' p. 163), six years later, under *Mangusta mungo*, says: "Hab. in India orientali." In fact, the real habitat of La Mangouste, alias Mangouste à bandes, was first made known by Ogilby in 1835, when in an account of a collection of mammals collected in Gambia (1835, Proc. Zoöl. Soc. London, p. 101), he says: "Mr. Rendall has brought over specimens of two *Herpestes*, one of which, the *Herpestes Mongos* of Linnæus, very well figured and described by Buffon (Hist. Nat., tom. xiii. tab. 19), deserves to be noticed, for the purpose of correcting the habitat of the species, which, upon Buffon's authority, has hitherto been given as India, but which Mr. Rendall's specimens clearly show to be the west coast of Africa. The mistake originally arose from Buffon's having identified the *Mangouste à bandes*, the species at present under consideration, with the *Mongos* of Kæmpfer, unquestionably an Indian species (the *Herpestes griseus* of authors), and still commonly called by that name in Upper India, where many natives and Europeans keep it in a semidomestic state, for the purpose of destroying vermin. . . ."

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[1] "Habitat in Bengala, Persia, aliisque Asiæ calidioribus plagis."

[2] Die Manguste. Tab. CXVI. CXVI. B. The first reference is "*Viverra Ichneumon β.* Linn. syst. Ed. 12] p. 63." Plate CXVI is accredited in the list of plates (p. 587) as from "Buffon XIII. t. 19."

Thomas, in 1882, in his important paper 'On the African Mungooses' (Proc. Zoöl. Soc. London, pp: 59–93, Pl. III) said, under *Crossarchus fasciatus* (*loc. cit.*, p. 91): "This species by its locality, and not *C. zebra*, no doubt represents the early-known '*Viverra mungo*,' which was said to come from the 'East Indies.' No cross-striped Mungooses, however, are known from India, and the original specimens must have been obtained from the Cape. All the specimens with exact localities that I have seen come from the eastern parts of the Colony, and none from the western; so that we may suppose that its true range is very similar to that of *Herpestes pulverulentus*. Probably, however, tame examples were sometimes brought down to Capetown, where they would be seen by the earlier travelers." Thomas was so fully convinced that the *Viverra mungo* Gmelin is the *Crossarchus fasciatus* of later writers that he felt called upon to explain in a footnote his reason for ignoring the rule of priority in this case and accepting *fasciatus* instead of *mungo*, as follows: "This name [*mungo*] is so utterly barbarous, and that of *H. fasciatus* so well known, that I think we are justified in ignoring it and using Desmarest's classical and appropriate term" (*loc. cit.*, footnote to p. 90).

The status of *Viverra mungo* (=La Mangouste of Buffon and Daubenton) has a vital bearing on the correct application of the generic name *Mungos*, revived by Wroughton[1] in 1907 to replace *Herpestes*

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[1] 1907, Ann. Mag. Nat. Hist., (7) XX, pp. 110–121.

Illiger (1811), and for this reason has been presented in perhaps needlessly full historic detail. It also has an equally important bearing on the specific name of the "Common Mongoose" of India. Wroughton used *Mungos* for a group of small African mongooses to which I have applied *Galerella* Gray (p. 175).

The Generic Name *Mungos* Geoffroy and Cuvier

The genus *Mungos*, like many of the early genera of post-Linnean origin, was introduced rather informally and without much detail by E. Geoffroy and G. Cuvier in their 'Mémoire sur une nouvelle division des Mammifères' in the 'Magasin Encyclopédique' in 1795 (II). This memoir is stated by the authors to be merely a sketch or outline to be amplified later, with some of the genera presented provisionally. The higher groups are only briefly characterized, and their content indicated by an enumeration of the genera, designated only by vernacular names, followed by technical names in parentheses, of the species respectively referred to them. The following are examples from the Plantigrades (*loc. cit.*, p. 184): ". . . les ours (*ursus*, L.); les ratons (*ursus lotor*, L.); les coatis (*viverrae nasua, narica, tetradactila et vulpecula*, L.); les blaireaux (*ursus meles*, etc.); . . . les mangoustes (*viverra ichneumon et mungos*); . . . ." This is followed by a tabular classification of the orders and genera. The classification of the Plantigrades (p. 187) is as follows:

> "Ordre III. PLANTIGRADES. Doigts onguiculés; trois sortes de dents; point de pouces séparés; plante entière appuyée."

The ten genera referred to this order follow in a single column, the vernacular name standing first and the technical equivalent following it in parenthesis, thus:

"Ours (*Ursus*).
Raton (*Lotor*).
Glouton (*Gulo*).
Blaireaux (*Taxus*).
Mangouste (*Mungos*).
Coati (*Nasua*).
Kincajou (*Potos*).
Taupe (*Talpa*).
Musaraigne (*Sorex*).
Hérisson (*Erinaceus*)."

In the preceding enumeration four of these genera are credited to Linnæus; two (*Gulo*, *Nasua*) date from Storr (1780); the other four (*Lotor*, *Taxus*, *Mungos*, *Potos*) first appear here, but two of them are antedated by names given by Storr (*Lotor* by *Procyon*, *Taxus* by *Meles*), leaving two, *Mungos* and *Potos*, both in current use. *Potos* was monotypic, with "*Viverra caudivolvula*, L." as type. *Mungos* contained two species, *Viverra ichneumon* Linnæus and *Viverra mungo* Gmelin. *Viverra* *mungo* is therefore automatically the genotye of *Mungos*. Furthermore, *Viverra mungo* is not a species of *Herpestes* Illiger (type, *Viverra ichneumon* Linnæus, by several "subsequent designations"), it being noncongeneric with the genotype of *Herpestes*.

As already shown in the discussion of "La Mangouste" of Buffon and Daubenton, it is the banded mongoose of Africa, the *Crossarchus fasciatus* of current nomenclature, which should henceforth bear the name *Mungos mungo* (Gmelin). *Ariela* Gray (1864) is a synonym of *Mungos*, having been especially founded for the South African banded mongoose (*Ichneumon tænionotus* A. Smith) under a misapprehension of its real characters. *Mungos* of Gray (1864, Proc. Zoöl. Soc. London, pp. 575–577), it singularly happens, is essentially the *Mungos* of Geoffroy and Cuvier, although Gray evidently knew nothing of the *Mungos* of these earlier French authors, this agreement being apparently a coincidence. Under his *Mungos fasciatus* Gray placed *Herpestes mungo* Desmarest, thus rendering this species, under modern rules, automatically the genotype of his genus *Mungos*.

The restoration of *Mungos* to its proper place in nomenclature need not in the least disturb the stability of *Crossarchus* F. Cuvier (1825), which has, by monotypy, *Crossarchus obscurus* F. Cuvier as its genotype, for which and later described allied forms it should be retained. As thus restricted *Crossarchus* forms a group very different from the banded mongooses for which *Mungos* is available and to which it should be restricted. Gray showed good judgment in separating the two groups generically. Attention has recently been called to the generic distinctness of these groups by Pocock, he adopting for the banded mongooses Gray's unavailable name *Ariela*.[1] He also calls attention to the fact that the inclusion of the two groups under *Crossarchus* was due to erroneous information concerning the structure of the anal glands. Before meeting with Pocock's paper I had become strongly impressed with their incongruity and their evident generic distinctness.

The Generic Name *Herpestes* Illiger

Herpestes Illiger (1811), type,[2] *Viverra ichneumon* Linnæus, after almost universal employ for three-fourths of a century, was hastily and, as it now appears, needlessly displaced in 1907[3] by *Mungos* Geoffroy and

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[1] On the severance of *Ariela* Gray (=*Mungos*, *s.s.*) from *Crossarchus* see Pocock, 1916, Proc. Zoöl. Soc. London, p. 350 and figures on pp. 353, 356, 360, 369.

[2] By subsequent designation (Anderson, 1878, 'Anat. Zool. Res. Exped. Yunnan,' I, p. 171; Thomas, 1882, Proc. Zoöl. Soc. London, p. 63.

[3] Cf. Thomas, Ann. Mag. Nat. Hist., (7) XIX, p. 119, footnote.

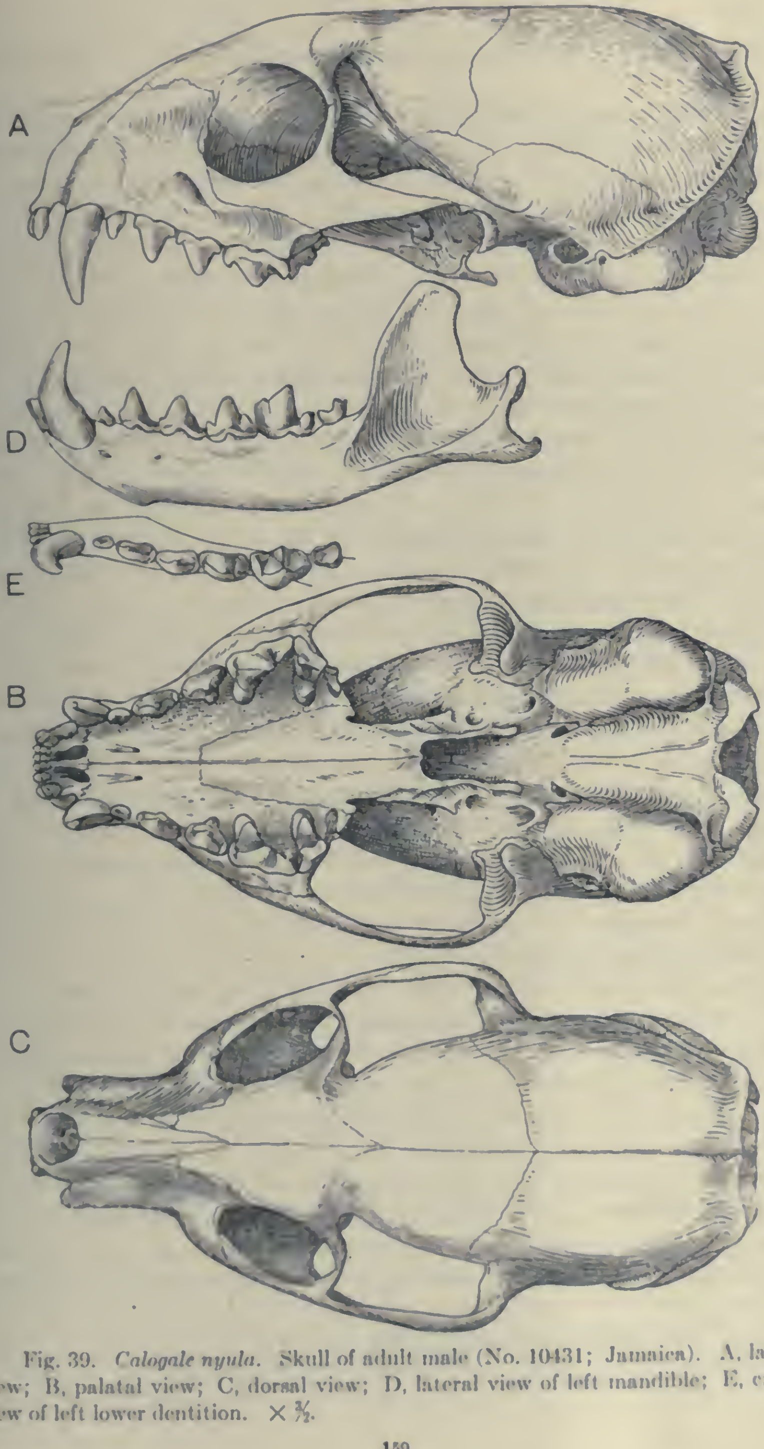

Fig. 39. *Calogale nyula.* Skull of adult male (No. 10431; Jamaica). A, lateral view; B, palatal view; C, dorsal view; D, lateral view of left mandible; E, crown view of left lower dentition. × ⅔.

Cuvier and immediately the latter became current for the greater part of the mongooses of both Africa and Asia. It should now be returned to its time-honored place in nomenclature, through the allocation of *Mungos* to its proper station.

The Technical Name of the "Common Mongoose of India"

Text Figures 39 and 40

J. E. Gray in 1864 (Proc. Zoöl. Soc. London, pp. 560–565) removed most of the small mongooses of both Africa and Asia from the genus *Herpestes* and divided them into several new generic groups that require consideration in connection with the determination of the proper specific, as well as the generic, name of the so-called "Common Mongoose of India." These genera, in the order of page precedence, are *Calogale* (p. 560), *Galerella* (p. 564), and *Calictis* (p. 564). The last two are monotypic, rendering the genotype of each automatically determinable, that for *Galerella* being *Herpestes ochraceus* Gray (1848), and that of *Calictis* being *Herpestes smithi* Gray (1837). *Galerella* is therefore available for the weasel-like mongooses of Africa, and has no bearing on the nomenclatural status of the "common mongoose" group of India. *Calogale* is a heterogeneous association of both African and Indian species, the former belonging in *Galerella*. Of the fourteen species originally included in *Calogale*, four are Indian, nine African, the other from an unknown locality. The genotype of *Calogale* is *Herpestes nepalensis* Gray, by designation of Thomas in 1882 (Proc. Zoöl. Soc. London, p. 63). As *Calogale* has precedence of four pages over *Calictis*, and as their genotypes are congeneric, *Calogale* is the generic name available for the "common mongoose" group of India.

As already shown (*supra*, pp. 157, 158), not only is *Mungos* untenable as a genus name for any Indian mongoose, but also the species name *mungo* is equally a misnomer when applied in the same connection, it belonging unquestionably to the banded mongoose group of Africa.

Prior to 1915 the species name *griseus*[1] was usually applied to the "common mongoose" of India, in which year *mungo* (ex Gmelin) was adopted in its place by Wroughton[2] in an article entitled 'The Common Indian Mongoose,' in which he says: "The oldest specific name for this animal is '*mungo*.' In Report No. 1,[3] I erroneously stated that Gmelin gave no type-locality for the species, but this was a mistake, for in his

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[1] Ex *Ichneumon griseus* E. Geoffroy, 1813, 'Descrip. de l'Egypte, Hist. Nat.,' II, p. 138. Also of Desmarest (1818, ex Geoffroy), and of later authors generally.

[2] 1915, Journ. Bombay Nat. Hist. Soc., XXIV, No. 1, September 20, pp. 50–54.

[3] 1912, 'Mammal Survey of India,' Journ. Bombay Nat. Hist. Soc., XXI, p. 401.

Syst. Nat., p. 84, 1787, he writes 'Habitat in Bengala, Persia, aliisque Asiae callidioribus plagis.' The specimens in the Bengal, Bihar, Orissa collection of the Mammal Survey are therefore topotypes, and at last we have a firm foundation for dealing with the species." In view of the history of the case as set forth in the preceding pages of this article, this statement is, to put it mildly, a bit surprising, especially in view of Thomas' admissions in 1882 (see above p. 156), and the fact that the name *Viverra mungo* had been correctly assigned to the banded mongoose group of Africa for over a century, and the error in its originally assigned "habitat" had been known for three-fourths of a century. As already shown (*supra*, p. 156), the barbarous character of the name *mungo* alone prevented Thomas, in 1882, from giving the name its rightful priority over *fasciatus*.

In commenting on the case Wroughton adds: "The names *nems*, *edwardsi*, and *griseus* are supported by descriptions too vague to indicate more than that the animal was the large mongoose of India." In his synonymy of *Viverra mungo* Gmelin, Wroughton included four names, of one of which (*Mangusta nyula* Hodgson, April 1836) he says: "Three cotypes of *M. nyula* are in the National Collection and agree entirely with these specimens from Bihar, Orissa." *M. nyula* is the only species among the four cited under *Mungos mungo* that is not rated as either indeterminable or as a synonym of *nyula;* hence logically *nyula* should replace *mungo* as the earliest identifiable specific name for the group, which should stand as *Calogale* (or *Herpestes*) *nyula* (Hodgson). This does not conflict with the recognition of *Herpestes nepalensis* Gray, of later date (October 1837), as genotype of *Calogale* unless the two species should prove to be the same, in which case of course the genotype will bear the earlier name of *nyula*.[1] It may be noted that Thomas has nominated a lectotype for *Viverra* (*Mangusta*) *nyula* (Hodgson) from the cotypes of this species in the British Museum (cf. 1918, Journ. Bombay Nat. Hist. Soc., XXV, January 15, p. 370.

When Gray published his revision of the mongooses in 1864 he was evidently greatly handicapped by the scantiness of his material and by its poor quality, no mention being made in many cases of the skull of the forms he recognized. This may also explain his singular allocations of some of the small mongooses of Africa and India, particularly of those he associated under *Calogale*, and his retention of *Herpestes griseus* (auct.) and other allied forms in *Herpestes*. Under *Calogale* he noted, however, the close resemblance of both *nyula* and *nepalensis* to "*griseus*."

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[1] Respecting the status of *Herpestes nepalensis* Gray, see Wroughton, 1917, Journ. Bombay Nat. Hist. Soc., XXV, March 30, p. 68.

Neither *Calogale* nor *Galerella* was recognized by subsequent authors until Matschie adopted *Calogale* as a full genus, without discussion or explanation, in 1914[1] for the African group referred below to *Galerella* (pp. 175, 182). In this paper Matschie not only reinstated nearly all of the previously described forms of this group which had been rejected by Wroughton and Thomas as synonyms but added thirteen new ones, many of them based on single specimens, and apparently with little regard for geographical considerations, and quite in agreement with his adoption of *Calogale* instead of *Galerella* for the African group.

Calogale, as here restricted, is much more nearly related to *Herpestes* than to *Galerella*, the "common" mongooses of India being a reduced type of the ichneumons of Africa, resembling them in pelage, which is long and coarse in both, and also in external form, but differing in important details of cranial structure (Figs. 39, 41, 42, 45), especially of the postpalatal region and in the form of the bullæ. Taxonomers will differ respecting the rank that should be assigned to *Calogale*. For those who give it generic value, the proper name for the Indian mongoose formerly known as *Herpestes griseus* should be *Calogale nyula* (Hodgson), and for those who reject *Calogale* as a full genus, it should be *Herpestes nyula* (Hodgson), with of course trinominals for the various subspecies of the group.

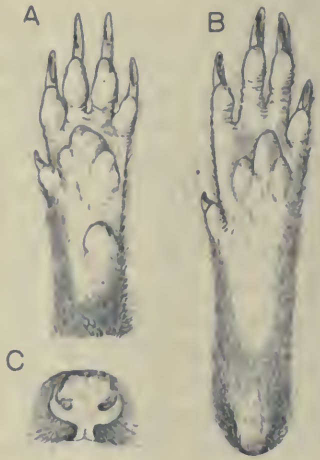

Fig. 40. *Calogale nyula* (No. 10431). A, palmar surface of left fore foot; B, plantar surface of left hind foot; C, rhinarium. Natural size.

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[1] 1914, 'Einige Hermelin-Mangusten von Ost- und Mittelafrika,' von Paul Matschie. Sitzungsb. Ges. Naturf. Freunde Berlin, No. 10, December, pp. 435–457.

The Vansire of Buffon and the *Mustela galera* of Schreber and Erxleben

The "Vansire" of Buffon and Daubenton (1765, 'Hist. Nat.,' XIII, pp. 167–170, Pl. XXI) and the technical name *Mustela galera* of Schreber (1777, 'Säugthiere,' III, Pl. CXXXV, and Erxleben (1777, 'Syst. Reg. Anim.,' p. 453) have primarily the same basis.[1] The animal described as the Vansire is said to have been brought from Madagascar, and was identified by Buffon and Daubenton with the "Vondsira" of Flacourt, mentioned briefly in his 'Histoire de la grande île de Madagascar' about a century before. The name "Vohang-sira" transmitted by Poivre to these authors was modified by them to "Vansire" for greater facility of pronunciation. Later I. Geoffroy Saint-Hilaire (1839, Mag. de Zool., Mamm., pp. 28, 29 of the text to Pls. XIV and XVII) gave a satisfactory explanation of the several forms of this word as used by the natives of the environs of Tamatave, who applied it to species of the old *Galidictis* group. Besides this, the description of the Vansire by Buffon and Daubenton suggests this application of the name, especially in respect to size, coloration, and the number of cheek-teeth, namely six on each side in the upper jaw and five on each side in the lower jaw, making a total of thirty-eight teeth in all. As said by Mivart in 1882 (Proc. Zoöl. Soc. London, p. 189): "It appears that it is a species of this genus [*Hemigalidia* Mivart = *Salanoia* Gray] which is the Vansire of Buffon (Hist. Nat. xiii. p. 167, pl. 21), as had it been *Galidia* the black-ringed tail would surely have been indicated."

Yet the name Vansire of Buffon and the technical name *Mustela galera* of Erxleben were early transferred exclusively to an African mongoose, under the belief that while the animal originally described by Buffon and Daubenton as the Vansire may have been brought, as stated by them, from Madagascar,[2] it came originally from Africa and that in reality it was an African species. This is the so-called Water Mongoose, or Marsh Mongoose, of West and South Africa (*Herpestes paludinosus* G. Cuvier), for which the name *Viverra* (or more commonly *Herpestes*) *galera* was in nearly universal use down to about 1908. In 1882 Thomas expressed the then prevalent belief respecting the Vondsira of Flacourt and the Vansire of Buffon as follows: ". . . . Its reputed occurrence in Madagascar caused Dr. Gray and others to believe that there were two species, the one in Africa being naturally supposed to be distinct; but now, as no other specimens have since occurred in Madagascar, we are justified in concluding that Flacourt only saw an introduced specimen, and that it is not indigenous to that island" (1882, Proc. Zoöl. Soc. London, p. 73). In a footnote to a preceding page (p. 60) of the same paper, he had already said: "Prof. Milne-Edwards informs me that, in his opinion, 'Le Vansire' (*Herpestes galera*), usually said to have originally come from Madagascar, was certainly not obtained there, no other collectors having met with it in that island since."

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[1] Erxleben cites Schreber's Plate CXXXV, which preceded the text in publication, while Schreber, in his text, cites Erxleben's *Mustela galera*. The specific name *galera* is therefore to be credited to Schreber. While Schreber's legend for Plate CXXXV is "*Mustela galera* 'Brown,'" Schreber, in his list of the plates of Volume III of the 'Säugthiere' credits it to Buffon ("Buff. XIII. t. 21").

[2] Eleven years later, however, Buffon (1776, 'Hist. Nat.,' Suppl., III, pp. 173, 174) made the following reference to the Vansire: "Le Vansire est, comme nous l'avons dit, un animal de Madagascar & de l'intérieur de l'Afrique. . . ." It was also probably on this basis that Erxleben gave "Habitat in Guinea et Madagascar" for his *Mustela galera*. Desmarest, in 1828 ('Dict. des Sci. Nat.,' LVI, p. 487), however, defined Vansire as: "Nom specifique d'une mangouste de Madagascar et de l'Isle-de-France."

A quarter of a century later (in 1908) Thomas had abandoned this earlier view respecting the pertinency of the name *galera* to the "Marsh-Mungoose." In a joint paper with Wroughton on a collection of mammals from Portuguese South Africa[1] these authors (*loc. cit.*, p. 167) say: "The name *galera* has hitherto been supposed to date from Erxleben,[2] whose primary basis for the name was the 'Galera' of Brown's 'Jamaica,'[3] which is no doubt the Marsh-Mungoose. But unfortunately Schreber's plate[4] of '*Mustela galera* Brown,' is one year earlier, and instead of being really based on Brown's Mungoose, is a mere coloured copy of Buffon's figure[5] of the 'Vansire' of Madagascar, which, as Gray suggested in 1864,[6] is certainly the animal usually known as *Galidia elegans* I. Geoff. Consequently this latter must bear the name of *Galidia galera* Schreber, and another name be found for the Marsh-Mungoose." After discussing various other names with reference to their possible application to the Marsh Mongoose these authors say: "Then follows the 'Vansire' (*Atilax vansire*) of Geoffroy and F. Cuvier,[7] which is undoubtedly the Marsh-Mungoose, but though the figure and description [also the generic name *Atilax*] date from 1826, the technical name [*Atilax vansire*] was only given to the animal on the appearance of the General Index in 1842. Before this latter date there was published G. Cuvier's name *Herpestes paludinosus*,[8] which antedated Smith's *Mangusta urinatrix*[9] by one month, and appears to be the tenable title of the animal under consideration."

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[1] 1908, 'List of Mammals obtained by Mr. Grant on the Gorongoza Mountains, Portuguese S. E. Africa.' By Oldfield Thomas and R. C. Wroughton. Proc. Zoöl. Soc. London, I, pp. 164–173.

[2] "Syst. R. A., p. 453, 1777."

[3] "P. 485, Pl. XLIX, 1756."

[4] "Säug. iii. pl. 135, 1776 (quoted by Erxleben)."

[5] "Hist. Nat. XIII, p. 167, Pl. XXI, 1765."

[6] "P. Z. S. 1864, p. 523."

[7] "H. N. Mamm. III., p. 198, 1826 "

[8] "Règne Anim. (2) i, p. 158, April 1829."

[9] "Zool. Journ., IV. p. 437, May 1829."

Although Thomas and Wroughton so positively identify the Vansire of Buffon with *Galidia elegans* I. Geoffroy, there seems good reason to question this assignment of Buffon's Vansire. Geoffroy himself, in his discussion of the names Vondsira of Flacourt, Vounsira and Vontsira sent to him by his collectors Bernier and Goudot in Madagascar, admitted their practical identity, as applied by the natives to small viverrine carnivores, with the name Vohang-sira transmitted to Buffon by Poivre, from which (as stated above) the describers formed the name Vansire, Geoffroy adding: "Cette identité de noms confirme l'opinion que j'ai émise plus haut sur les rapports intimes du Vansire de Buffon et de Daubenton (mais non des auteurs modernes) avec les Galidies."[1] But he does not affirm that he believes the Vansire to be identical with his *Galidia elegans*, which Thomas and Wroughton so positively state should be called *Galidia galera*.

The Vansire was evidently described with particularity by Daubenton, and the figure of the animal agrees with the description. *Galidia elegans*, as noted by Mivart in 1882,[2] has the tail conspicuously ringed with black, while no such feature is indicated in the figure or the description of the Vansire. *Galidia elegans* has the general coloration of the body "d'un rouge marron foncé," and the tail "colorée par grands anneaux alternativement noirs et de la couleur générale du pelage." The Vansire is said to have all parts of the body uniform dark brown, and the accompanying figure shows no indication of rings on the tail. There are said to be twelve cheek-teeth in the upper jaw and ten in the lower, the whole number of teeth being 38. This conforms numerically with the dentition of *Galidia elegans*. It also agrees with that of *Salanoia* (= *Hemigalidia* Mivart). The Vansire further agrees with the *Salanoia* group in having the tail non-annulated and uniform in color with the back; it is also much shorter than the head and body[3] instead of nearly as long, as is the case in *Galidia elegans*.

Recently Pocock[4] has protested vigorously against the assumption that the Vansire of Buffon and Daubenton was later described as *Galidia elegans* by Geoffroy, and that the name of the type-species of *Galidia* must be changed to *Galidia galera* (Schreber). He concludes: "The familiar specific name of this animal [Geoffroy's *Galidia elegans*] must, therefore, in my opinion, be allowed to stand, and the Vansire of Buffon, with *galera* attached to it, be relegated to the limbo of mammalian species unidentifiable at the present time." With this conclusion I am heartily in accord, the main facts of the case being as follows:

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[1] 1839, Mag. de Zool., Mamm., p. 29, Pls. XVII-XIX.

[2] 1882, Proc. Zoöl. Soc. London, p. 189.

[3] The length of the head and body is given by Daubenton for the Vansire as 13 inches, and the length of the tail as 7 inches.

[4] Pocock, R. I., 1915, 'Note on the Specific Name of the Type-species of *Galidia*.' Ann. Mag. Nat. Hist., (8) XVI, August, pp. 123–124.

(1) The Vansire of Buffon and Daubenton was based on a stuffed skin, containing the bones of the feet and the skull, received, as stated by the authors, from Madagascar.

(2) The animal was of small size (length of head and body 13 inches, of the tail 7 inches).

(3) Although so small, it was evidently adult; the premolar-molar formula was $\frac{4-2}{3-2}=11$, and the whole number of teeth 38.

(4) The name (*Vohang-sira*) under which it was received (modified to *Vansire* by its describers) indicates the correctness of the alleged origin of the animal, *Vohang-sira* having been shown by Geoffroy (*loc. cit.*) to be applied (with slight variations of the name) by the natives of Tamatave, Madagascar, to several small viverrine mammals of that region.

(5) The general characters of the Vansire, as given by the describers, indicate that it cannot be properly identified as *Galidia elegans*, but, on the other hand, agrees closely with members of the nearly allied genus *Salanoia*.

(6) Hence it has no near relationship to any form of African mongoose, and especially not with the large, heavily-built Marsh Mongoose, which has a premolar-molar formula of $\frac{3-2}{3-2}$, and only 36 teeth, the proper specific designation of which is *paludinosus* of G. Cuvier (1829) and not *galera* of Schreber (1776).

(7) The technical name *Mustela galera*, based on the *Vansire* of Buffon and Daubenton, is specifically unidentifiable, and hence nomenclatorially unavailable.

It may be added further that the genus *Galera* of Browne (1756 and 1789, 'Civil and Nat. Hist. Jamaica,' p. 485), aside from other grounds of untenability previously stated by me,[1] is not available under Opinion 5 of the "International Commission on Zoölogical Nomenclature," the 1789 edition being a literal reprint, so far as the text is concerned, of the edition of 1756.

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[1] 1908, 'The Generic Name *Galera* Browne,' Bull. Amer. Mus. Nat. Hist., XXIV, September 11, pp. 586–589.

In this note several misprints may be here corrected as follows: Page 588, line 6 from top, for Browne's read Buffon's; same page, last line, for p. 154 read p. 73. Also, p. 589, last sentence, in view of the above summary change to the effect that "*Galera* Browne, 1789 (type *Mustela galera* Erxl.)" s unavailable and cannot supersede either *Atilax* F. Cuvier or *Herpestes* Illiger, as there implied.

The Vansire of F. Cuvier

The Vansire of F. Cuvier (1826, 'Hist. Nat. Mamm.,' livr. 54, June) is indeterminable from the original description. He begins his account of it with the assumption that it is the same animal as the Vansire of Buffon and Daubenton, which, as shown above, is now conceded to be an indeterminate viverrid of Madagascar, from which country the original specimen was correctly said to have come. His article is, in substance, as follows.

Naturalists heretofore have had a very imperfect knowledge of this species. Buffon gave us the first account of it; and he had only a stuffed skin, in which he found the skull and the bones of the feet. It is this skin that he has figured, and no other figure of the Vansire has been given as we do not agree with Buffon that the animal figured by Seba under the name *Mustela javanica* (I, p. 77, No. 4, tab. 48, fig. 4) was the Vansire. M. Geoffroi [sic] Saint-Hilaire has also spoken of the Vansire, and from individuals that had lived in the Paris menagerie, but only to show its relation to the Ichneumon, from which it had before been separated and placed with the martens. . . . Nevertheless we find in the observations of Buffon and of Geoffroi sufficient indications to show that the Vansire and Ichneumons do not differ more from each other than do well characterized species of Ichneumons. Indeed d'Aubenton has informed us that the Vansire has a less number of cheek-teeth ("machelières") than the Ichneumons, and Geoffroi has expressly said that the braincase is more swollen and wider, and that the jugal and orbital processes are shorter and do not meet to complete the orbit. Now, the form of the head ("de la tête") of the individual which we have before us ("sous les yeux") is entirely in agreement with these indications, as can be seen by the figure we give [a plate of the animal, not of the skull] in comparison with those we have already given of different species of Ichneumon. As to the rest, these animals differ only in the organs of the senses ("ces animaux ne différent point par les organes des sens"); but the digits ("doigts"), which in the Ichneumons are joined together by a membrane, are on the contrary entirely free in the Vansire, and in walking they spread apart. As to the organs of generation, the male which we describe has the testicles free, we perceive near these parts no trace of a pocket ("poche"), and the penis, of which the gland appears to form two hemispheres, is directed forward.

All parts of the body are clothed with a pelage of brown, nearly black, which takes a slight yellowish tint on a small part of the sides of the lower jaw. This pelage is composed of woolly hairs, very thick and brown, and of silky hairs, rather few in comparison with the first and entirely black except on the muzzle and neck, where they have an apical ring of whitish or brown. The nose ("mufle") is flesh color and the eyes are clear chestnut. It has a length of eighteen inches from the end of the nose to the base of the tail, which has a length of twelve inches.

The Vansire is then sufficiently provided with characters of more than specific import to distinguish it from the Ichneumons. It consequently presents the type of a new group in this family, so natural and already so rich, and which was so small when, under the name *Viverra*, it comprised all those carnivores whose relationships were not determined. We would give to this group the name Atylace, *Atilax*, in consideration of the entire absence of an anal pouch.

From the above translation of F. Cuvier's account of his Vansire the following points may be noted:

(1) Cuvier believed that his Vansire was unquestionably the same species as the Vansire described and figured by Buffon and Daubenton, which he supposed he was redescribing and refiguring.

(2) In all probability his specimen, the type of his Vansire, was a menagerie specimen still in the flesh.

(3) No information was given as to its "patrie" or probable geographic origin.

(4) The external characters given are insufficient for its specific identification.

(5) It must have been a rather small specimen[1] (he says it was a male), if, as subsequent authors have supposed, it be referable to the Marsh Mongoose of South Africa.

(6) His statement about the absence of the anal pouch ("toute absence de poche à l'anus"), is evidently due to oversight, as this character is developed in the entire group and especially so in the Marsh Mongoose (see footnote, p. 169).

(7) No reference whatever is made to the dentition of the type specimen; it is possible to infer, from his allusion to Daubenton's statement to the effect that the Vansire had fewer cheek-teeth than are found in the Ichneumons, that his Vansire also had fewer.

(8) He cites Geoffroy to the effect that the skull of the Vansire is broader than that of Ichneumons, and that the orbit is not a complete ring of bone as in Ichneumons. This statement does not apparently have any necessary relation to the type specimen of his Vansire, the skull of which he gives no intimation of having examined.

(9) Digits free, or unconnected by a membrane, a character of the Marsh Mongoose group, and the only one which renders it certain that Cuvier's Vansire is referable to that group.[2]

(10) No other characters are indicated (the size and coloration not being diagnostic) by which Cuvier's Vansire can be identified, and the species is therefore specifically indeterminable from the original description.

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[1] Head and body "dix-huit pouces," tail "douze pouces," or approximately 457 mm. and 305 mm., making a total length of 762 mm., or a little more than one-half that of an adult Marsh Mongoose. Sclater (1900, 'The Fauna of South Africa,' Mamm. I, p. 64) gives for head and body (mounted specimen) 24 inches, tail 13 inches, or 610 mm. and 330 mm. respectively, and therefore a total length of 940 mm.

[2] Pocock (1916, Proc. Zoöl. Soc. London, p. 363) says: "The absence of the interdigital webs in this [Marsh] Mongoose constitute, in my opinion, a valid reason for resuscitating the genus *Atilax* (text-fig. 5, C, D)." Pocock consistently recognized *Atilax* as a full genus throughout his important paper here cited on the external characters of the mongooses.

(11) It is to be further noted that the original account contains no technical specific name for the Vansire, although the group name *Atilax* is based on it.

The Genus *Atilax* F. Cuvier

The genus *Atilax*, as explained above, was proposed by F. Cuvier in 1826, at the end of the description of his Vansire, which is the only species he referred to it, and which is therefore the genotype. The description of the Vansire includes only two tangible characters, (1) digits unconnected by a membrane, and (2) absence of the anal glands found in all other species of Mongoose. The latter, however, proves to be without foundation,[1] so that the unwebbed condition of the toes is the only character furnished by the original description. This, however, is a definitive character of high importance, and serves to identify beyond doubt the group to which the name *Atilax* belongs. Three years later, however, the author formally introduced the genus *Atilax* into his system of classification, in his article 'Zoologie = Mammalogie' (1829, 'Dict. Sci. Nat.,' LIX, pp. 357–519) as Genus 21 of his Order III, "Les Carnivores" (*loc. cit.*, p. 456), separating it from "Les Mangoustes" (*Herpestes* Illiger) by "Les Genettes" (*Genetta* G. Cuvier). His diagnosis contains all the essential characters of the group, plus the original error respecting the absence of the anal glands, as follows:

> 21.^{e} Genre
>
> Les Atilax; *Atilax*, Fréd. Cuv.
>
> Ces animaux, qui ont toujours été réunis aux mangoustes, ont pour caractères deux fausses molaires de moins que ces derniers aux deux mâchoires; des doigts entièrement libres, la verge dirigée en avant, et enfin ils sont privés de toute poche anale.
>
> Ils sont en outre remarquables par la grande largeur de leur boîte cérébrale et la brièveté de leur museau.
>
> On n'en connoît encore qu'une espèce, qui est de l'ancien monde.

The valid characters of the group are (1) premolars $\frac{3-3}{3-3}$, instead of $\frac{4-4}{4-4}$ as in *Herpestes;* (2) toes entirely free or unwebbed which is not the case in any other closely allied genus; (3) the great breadth of the braincase and the shortness of the rostrum.

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[1] R. I. Pocock, in a recent paper 'On the External Characters of the Mongooses (Mungotidæ),' (1916, Proc. Zoöl. Soc. London, pp. 349–374, Figs. 1–10), says (*loc. cit.*, p. 366): "The presence of a glandular anal sac in Mongooses has long been known; but its invariable occurrence within the group has been disputed. I have found it without exception in all the specimens I have examined, even in those belonging to species in which its existence has been denied. Cuvier, for example, said that the Marsh-Mongoose, which he named *Atilax vansire* (St. Hilaire & Cuvier, Hist. Nat. Mamm. ii, pt. 54, pl. 198, 1826) is without it. It happens, on the contrary, to be rather exceptionally well developed in that form (Fig. 9, B, C)."

Atilax is still monotypic, has no definite geographic area of distribution, and the genotype is without a technical specific name. Yet this Vansire became, through erroneous citation by later authors, "*Atilax vansire* F. Cuv., Mamm. livr. 54, 1826" cited in the literature for three-fourths of a century without challenge, usually as a synonym of the composite and technically intangible "*Mustela galera* Erxleben." It has been stated,[1] however, that the author supplied no technical name for the species till it was entered in the general index to the 'Histoire naturelle des Mammifères,' issued on the completion of the work in 1842, where it is said to appear as *Atilax vansire.* I find an earlier citation of the name, however, by J. B. Fischer in his 'Synop. Mamm.,' 1829, p. 166, where he gives this reference: "*Atilax Vansire* Planch. du Dict. des Sc. nat. fasc. 51" which would imply a still earlier date of publication, 1828 or earlier. But Fischer's reference is not to the Vansire of F. Cuvier but to the Vansire of Buffon. It is given under his *Mustela galera*, the reference in full being "*Atilax Vansire* Planch. du Dict. des Sc. nat. fasc. 51. Voang shira Madagasc." As, however, the name *Atilax vansire* was not adopted by Fischer, it has no nomenclatural status.[2]

Notwithstanding F. Cuvier's clear definition of *Atilax* in 1829, the genus failed to receive further recognition till formally adopted by J. E. Gray in 1864 (Proc. Zoöl. Soc. London, pp. 508 and 556–560) in his 'A Revision of the Genera and Species of Viverrine Animals (Viverridæ),' under the emended form *Athylax*. References to it (as *Athylax*) during the previous thirty years were merely incidental, and often display surprising ignorance of its real characters and relationships.[3]

De Blainville, in his 'Ostéographie des Mammifères,' II, Des Viverras, Pl. v (1842), figured two skulls of *Mangusta* (=*Herpestes*), one with the legend "*Mangusta paludinosa*" (=*Herpestes paludinosus* G. Cuvier), the other with the legend "*Mangusta* (*Athylax*) *galera.*"

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[1] "Then follows the 'Vansire' (*Atilax vansire*) of Geoffroy and F. Cuvier, which is undoubtedly the Marsh-Mungoose, but though the figure and description date from 1826, the technical name was only given to the animal on the appearance of the General Index in 1842." Thomas and Wroughton, 1908, Proc. Zool. Soc. London, p. 167.

[2] I am unable to consult the plates of the 'Dict. des Sci. Nat.,' for verification of the reference given by Fischer, but Dr. T. S. Palmer has kindly furnished me with the desired information regarding it. He writes that the plate is unmarked, "but according to the Table in Introduction it is No. 40, to accompany text in Vol. 29 [1823], p. 62. Cahier 51." The article on page 62, Vol. 29, is by Desmarest and not by F. Cuvier, and refers exclusively to the Vansire of Buffon and not to the Vansire of Cuvier, which was not published till 1826. Dr. Palmer adds: "Vansire is *not* a specific name in this volume."

[3] Thus, in 1839, I. Geoffroy St. Hilaire, in his notice of two new genera of carnivorous mammals (1839, Mag. de Zool., Mamm., p. 24 of text to Pls. XVII–XIX), in referring to "*Cryptocropta* [sic] Bennett and *Athylax* F. Cuvier," says: "Ces deux genres, en effet, sont indiqués comme étant de Madagascar, et ils sont incomplètement connus." This reference to *Athylax* shows that the vansire of F. Cuvier was here confused with the vansire of Buffon.

In 1828, Desmarest, in Vol. LVI of the 'Dict. Sci. Nat.,' p. 487, thus defines vansire: "Vansire. (Mamm.). Nom spécifique d'une mangouste de Madagascar et de l'Isle-de-France. (Desm.)." The vansire of F. Cuvier is the later described mangouste "grande des marais du Cap. (*H. paludinosus*)" of G. Cuvier (1829), while the vansire described and figured by Buffon and Daubenton is the banded mongoose, the *Crossarchus fasciatus* of current nomenclature. (See above, p. 155.)

The latter is mentioned in the accompanying text (p. 49) as "Un très-vieil individu du *M. galera*, type du genre *Athylax*," and subsequent authors[1] have accepted the statement as authoritative. I came to the conclusion that the two skulls figured by De Blainville were not congeneric, and consequently that Cuvier's Vansire had been wrongly identified as referable to the Marsh Mongoose. Further research, however, made it clear that the type specimen of Cuvier's Vansire probably was not full grown, and that its skull could not have been the skull figured by De Blainville as "type du genre *Athylax*"— a very old, heavily ossified skull that had apparently lost the molars of both jaws through age, while a first premolar was present in both jaws, giving a premolar formula of $\frac{4-4}{4-4}$, and consequently 40 teeth instead of 36. The general form of the skull is different from that of the figure of the skull of *Mangusta paludinosa* on the same plate. It seemed to me certain that the skull figured as that of the type of "*Athylax*" must have been a very old skull of some species of *Ichneumia*, and that therefore *Atilax* was to be construed as a synonym of that genus. A subsequent study of the description of Cuvier's Vansire at once showed that an animal of the size of the specimen described could not have had a skull of the magnitude of the one figured by De Blainville.

While the description of the Vansire contains nothing by which the type can be identified specifically, and while the main character of *Atilax* is a myth, enough can be gathered from the description as a whole to convince one that the type specimen, and consequently *Atilax*, would warrant its reference to the Marsh Mongoose group. The author's later formal diagnosis of *Atilax* renders it certain that it can be referred to no other generic group of mongooses.

The several forms of *Atilax* (whether species or merely subspecies) agree in essentials with G. Cuvier's *Herpestes paludinosus* (1829), the first form to receive a technical specific designation, and this may be taken as the genotype, since various writers have identified the Cuvierian vansire with this species; or, more technically expressed: *Atilax* F. Cuvier, genotype (by monotypy), Vansire F. Cuvier = *Herpestes paludinosus* G. Cuvier. The dental formula and the unwebbed feet, aside from other external and cranial characters, seem sufficiently to separate it from *Herpestes* (as represented by the type form). In its general character the skull of *Atilax* resembles that of *Ichneumia*, from which it differs

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[1] Gray (1864, Proc. Zool. Soc. London, p. 557) says, under his *Athylax vansire*: "The skull of the animal figured by F. Cuvier is engraved in De Blainv. Ostéogr. t. 5." He further says: "According to De Blainville's figure, the skull is more solid and stronger than that of *A. paludinosus*."

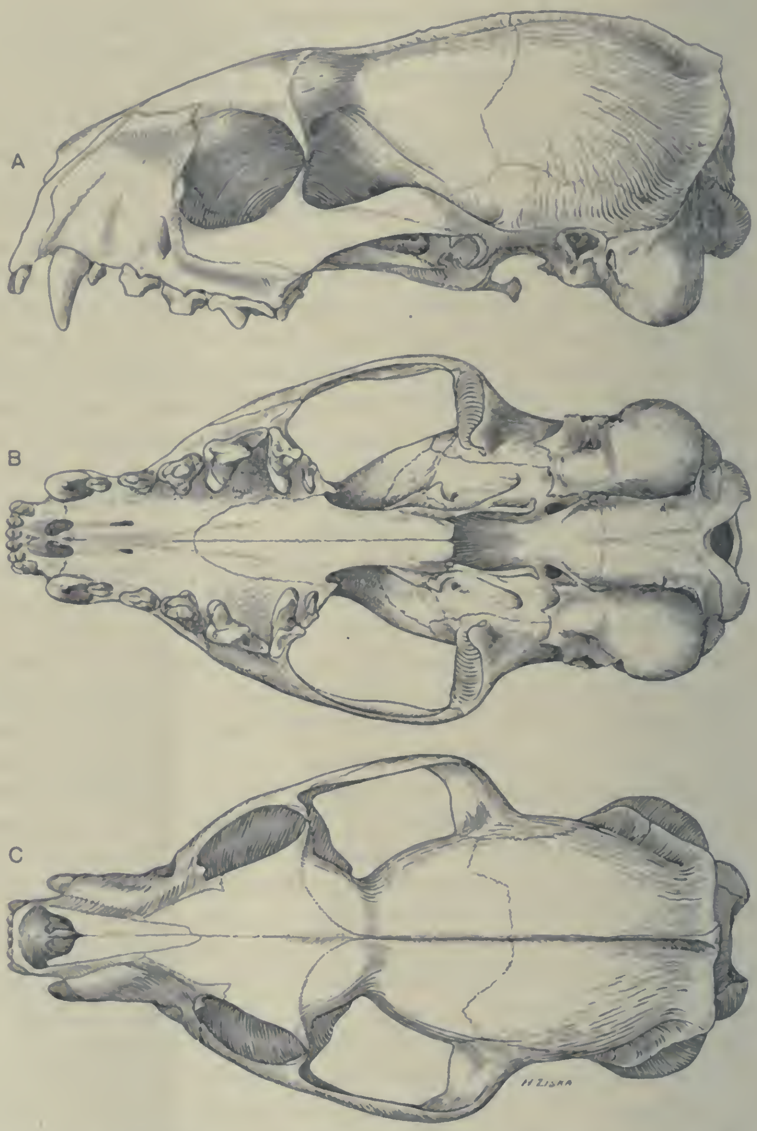

Fig. 41. *Herpestes ichneumon parvidens.* Skull of adult male (No. 51590). A, lateral view; B, palatal view; C, dorsal view. Natural size.

especially in its dental formula and in the naked instead of furred palmar and plantar surfaces of its unwebbed feet.

Herpestes Illiger

Herpestes Illiger, 1811, 'Prodr. Syst. Mamm. et Avium,' p. 135, here spelled *Herpertes*, corrected in list of errata (p. 302) to *Herpestes*. Type, by subsequent designation (Anderson, 1878), *Viverra ichneumon* Linnæus.

Herpestes ichneumon parvidens (Lönnberg)

Text Figures 41, 42, 44A

Mungos ichneumon parvidens Lönnberg, 1908, Arkiv f. Zool., IV, No. 16, April 29, p. 3. Type locality, Mukimbungu, Belgian Congo.

A single specimen, an old male, collected at Niangara, Belgian Congo, November 29, 1910, is provisionally referred to this form.

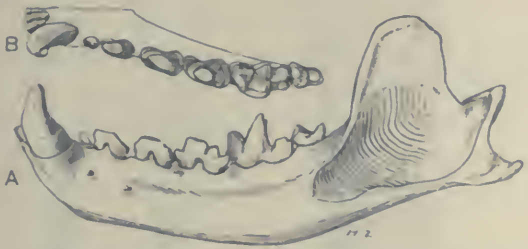

Fig. 42. *Herpestes ichneumon parvidens*. Adult male (No. 51590). A, lateral view of left mandible; B, crown view of left lower dentition. Natural size.

Collectors' measurements: Total length, 990 mm.; head and body, 545; tail vertebræ, 435; hind foot, 100.

Skull, condylobasal length, 97.0; zygomatic breadth, 49.0; least interorbital breadth, 15.3; postorbital breadth, 15.2; breadth across auditory bullæ, 36.6; length of auditory bullæ, 19.5; greatest breadth of auditory bullæ, 11.8; depth from plane of basisphenoid, 10.5; palatal breadth at base of incisors, 9.7; palatal breadth at base of canines, 16.7; palatal breadth at outer base of p^4, 29.0; least breadth of palatal tube, 7.1; length of palatal tube, 17.2; front of canine to posterior border of m^2, 35.5; upper premolar-molar series (p^1-m^2), 29.7; oblique length of p^4, 10, transverse breadth at front border, 6.2; mandible (symphysis to end of angular process, 67.4; height at condyle, 20.0; height at coronoid, 13.2; lower toothrow, 39.5; premolar-molar series, 32.5. The skull is that of an old male, with the sutures closed, the orbit closed, and the sagittal and lambdoid crests strongly developed.

This specimen is provisionally referred as above. Compared with an old female from Medje the pelage and coloration are similar in both, but the skull of the Niangara specimen (Figs. 41 and 42) is narrower and slenderer throughout, being less robust, with correspondingly weaker dentition, the palatal tube about one-fourth narrower, while the bullæ are more inflated, being about one-third larger than in the Medje specimen, referred provisionally below to *Herpestes ichneumon funestus* (Osgood).

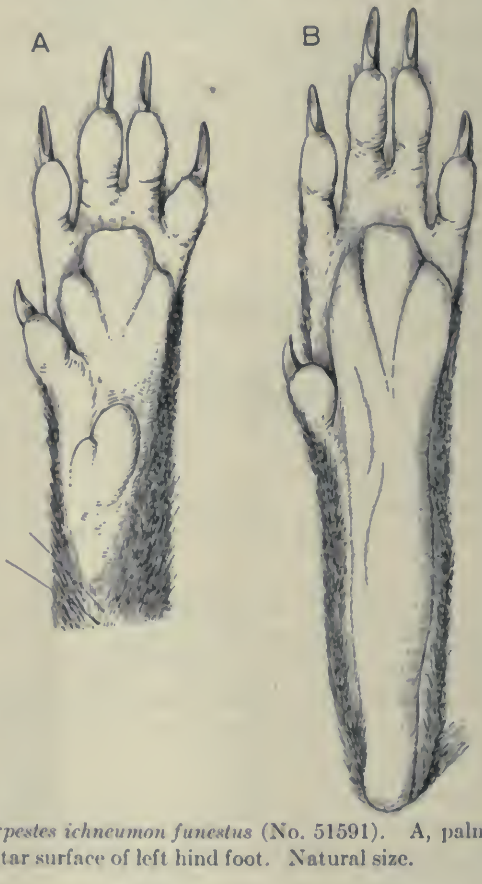

Fig. 43. *Herpestes ichneumon funestus* (No. 51591). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

Herpestes ichneumon funestus (Osgood)

Plates XXII; XXIII, Figure 1; and Text Figure 43

Mungos ichneumon funestus Osgood, 1910, Field Mus. Nat. Hist., Zoöl. Ser. X, No. 3, April 7, p. 17. Type locality, Naivasha, British East Africa.

Represented by 7 specimens (5 of which are immature), collected as follows:

Faradje, 2 (1 ♂ adult, native skin without skull, 1 ♀ juvenile), March 9, 1912; January 14, 1913.

Akenge, 1 (♀ juvenile), October 25, 1913.

Medje, 3 (1 ♂ subadult, 1 ♀ adult, 1 ♀ juvenile), January 11, 21, 1910; June 25, 1914.

Stanleyville, 1 (♂ juvenile), August 27, 1909.

Collectors' measurements of an old female (No. 51588) from Medje: Total length, 960 mm.; head and body, 510; tail vertebræ, 450; hind foot, 90.

Skull (same specimen), condylobasal length, 97.2; zygomatic breadth, 47.6; postorbital breadth, 16.1; length of palatal tube, 14.3; least breadth of palatal tube, 18.6; palatal breadth at base of incisors, 7.8; palatal breadth at outer base of p^4, 10.5; oblique length of p^4, 10.2, breadth of p^4 at front border, 6.1.

These specimens represent two phases of coloration, a dark and a light; both are represented by adult and half-grown specimens (Pls. XXII and XXIII, fig. 1), taken at Medje. The two specimens from Faradje are both very light colored, much lighter even than the light one from Medje. It is quite probable that a larger amount of material would show that two forms are represented in the present series, a light one in the veldt region, a dark one in the rain forest. For the present the series as a whole is provisionally referred as above, as all of the 7 specimens except 2 are immature, with only the milk dentition, and the skull of one of the adults is lacking.

GALERELLA Gray

Galerella GRAY, 1864, Proc. Zoöl. Soc. London, p. 564. Type, by monotypy, *Herpestes ochraceus* Gray.

It seems surprising that in spite of well-marked morphological differences the *Herpestes sanguineus-melanurus-ochraceus* groups and their near allies have so long failed of due recognition, and have been almost universally referred to *Herpestes* (=*Mongos* of recent authors), notwithstanding their many divergences from that group (genotype, *Herpestes ichneumon*). The inconsistency of the inclusion of *Galerella* in *Herpestes* has recently been noted by Pocock (1916, Proc. Zoöl. Soc. London, I, p. 350, footnote), but he failed to give *Galerella* generic rank, although he mentioned some of its distinctive features, and its resemblance in certain characters to *Cynictis*. In his later paper[1] *Galerella* is not mentioned, but in a footnote under *Mungos* (p. 523) he says: "I suspect this genus will prove to be divisible into three or more genera when better known."

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[1] 'The Classification of the Mongooses (*Mungotidæ*),' 1919, Ann. Mag. Nat. Hist., (9) III, June, pp. 515–5[illegible]

In 1907, R. C. Wroughton, in his paper 'On the African Mungooses usually referred to the *Herpestes gracilis* Group' (Ann. Mag. Nat. Hist., (7) XX, pp. 110–121) gave "a list of the names already given to members of this section," twenty-three in number. In his revision of the group eleven of these were relegated to synonymy, leaving twelve which he considered entitled to recognition, to which he added four forms as new subspecies, making sixteen forms. During the period 1908–1916, or in the nine years following the publication of Wroughton's review of the group, ten new forms were added (some as full species, others as subspecies), increasing the total number of forms to twenty-six. It is still, however, a compact group, all the forms being narrowly restricted to a common standard as regards size, details of structure, character of pelage and pattern of coloration. The geographic range of this, the *Galerella*, group extends from Abyssinia, Somaliland and southern Sudan southward over eastern and central Africa to the Cape region, and thence northward in western Africa to Nigeria and the Gold Coast.[1]

In general features *Herpestes* and *Galerella* are about as diverse as two genera can well be and be referable to the same subfamily. Compared with mongooses of the *H. ichneumon* type (Pl. XXIII, fig. 1), the species of *Galerella* (Pl. XXIII, figs. 2–4) are diminutive in size, slender in structure, with short, fine, close-lying pelage, a narrow tail, only slightly broader proximally than toward the tip; the premolars are $\frac{4-4}{3-3}$, and the number of teeth 38, as against premolars $\frac{4-4}{4-4}$ and 40 teeth in *Herpestes*. There are also other important cranial differences, particularly in the form of the auditory bullæ. In typical species of *Herpestes* the general size is near the maximum of the Herpestinæ[2]; the overhair is long, coarse and harsh; the tail is very thick, full proximally and tapering to a thin point. In *Galerella* the limbs are short and the feet small and comparatively weak, the pollex and hallux greatly reduced, the nails short and weak, the soles furred for nearly the proximal half (Fig. 46), and the tail is narrow and distichous. In *Herpestes* these conditions are reversed, the limbs being long and strong, the soles entirely naked (Fig. 43). In *Galerella* (Fig. 45 A and B) the auditory bullæ have the chambers subequally developed, the posterior being but little larger than the anterior, while in *Herpestes* (Fig. 41 A and B) the anterior chamber is small and the posterior enormously expanded, these two genera presenting nearly the extreme phases of divergence of the bullæ among the mongooses. Yet no one appears to have hitherto had the temerity to give Gray's genus *Galerella* even subgeneric recognition.

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[1] Does not occur in the Western Forest Province.—H. L.

[2] The linear measurements of *H. ichneumon* are nearly twice greater than in *Galerella*, and its mass about five times larger. In this connection see the present author on size as a group character in the American Sciuridæ (1915, Bull. Amer. Mus. Nat. Hist., XXXIV, pp. 160–166, Figs. 1–10).

There is a superficial resemblance in certain characters between *Galerella* (Pl. XXIII, figs. 2-4) and *Helogale* (Pl. XXIV, fig. 1), but the latter is far more herpestine than the former. The members of both are of small size in comparison with the forms of *Herpestes*, *Ichneumia*, *Atilax*, *Xenogale*, and *Bdeogale*, but the general size is much less in *Helogale* than in *Galerella*, and the tail is also relatively much thicker, shorter and rounded at the base. *Helogale* has short but strong limbs, broad feet, the toes all heavily developed and armed with powerful claws (Fig. 48), as well befits a burrowing type, which *Helogale* exemplifies. The skull characters, however, are quite similar except that *Helogale* (Fig. 47) has lost the first premolar in both jaws while *Galerella* (Fig. 45) retains the first upper premolar.

It has been customary since early days to consider the presence or absence of the first premolar, in one or even in both jaws, as of no taxonomic importance, and when absent in adults to presume it may have been present in the milk dentition. In my own experience I have almost invariably found that its presence or absence in nearly allied groups is accompanied by other features of differentiation of more or less importance. Also that when the first premolar is absent in the permanent dentition it is also absent in the preceding milk dentition. In the case of *Herpestes* (auct.) the premolar formula has usually been given as $\frac{4-4}{4-4}$, without indication that there are normal departures therefrom, even when *Herpestes* included *Atilax* (premolars uniformly $\frac{3-3}{3-3}$) and *Galerella* (premolars uniformly $\frac{4-4}{3-3}$). In the descriptions of the forms of these groups there is rarely any reference to the number of premolars. For instance, in the preparation of the present paper I have had occasion to look up the original descriptions of every species and subspecies of the *Galerella* group, and have found no reference to the number of premolars. The material I chanced to have at hand at the outset of this investigation represented only a single species (the type of the genus) of which I had nine skulls, only one of which had four lower premolars. Later I obtained further material, representing four additional species and subspecies. Of thirty skulls now in hand twenty-eight have three lower molars only, one has p_1 on both sides of the lower jaw, and one other has

p_1 on the left side only, and it stands internal to the toothrow at the antero-internal border of p_2. This material represents one-fifth of the forms currently recognized. There is therefore some significance in the practically uniform absence of p_1 in the *Galerella* group.

As bearing on size as a character in *Galerella* the following statistics are presented. The first series is a compilation of the measurements of the type specimen as given in the original descriptions of the currently recognized species and subspecies. Then follow measurements of small series of specimens of *G. ochracea*, *G. sanguinea rendilis*, *G. s. orestes*, and *G. s. ibex* which have passed through my hands. Of these, the external measurements were made by the collectors from specimens in the flesh; the skull measurements were made by me. The measurements of *Helogale hirtula robusta* and of *Herpestes ichneumon* are added for convenient comparison with those of the *Galerella* forms.

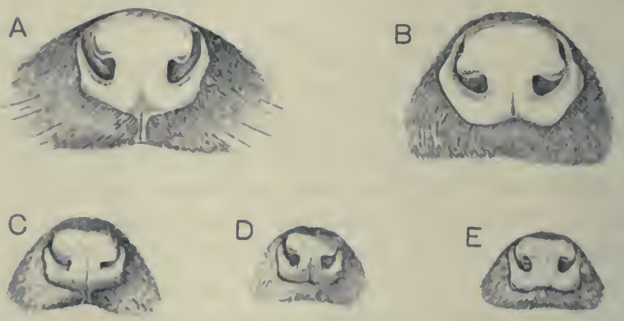

Fig. 44. Rhinarium. A, *Herpestes ichneumon parvidens* (No. 51590); B, *Crossarchus alexandri* (No. 51667); C, *Galerella ochracea ochracea* (No. 51108); D, *Helogale hirtula robusta* (No. 51101); E, *Mungos gothneh* (No. 51112). Natural size.

Measurements of twenty-four species and subspecies of *Galerella*, compiled from the original descriptions:

Head and Body	Tail Vertebræ	Hind Foot (mostly s. u.)	Skull (Condylobasal Length)
308(250–350)	269(240–325)	56(46–64)	64(57–68)

These external measurements were in many cases (doubtless in the majority) based on dry skins; in a few instances they are stated to have been taken from specimens in the flesh. The wide range between extremes of the external measurements is largely due to this cause, and to some extent discredits the averages. The extremes in the skull length are much less and should be taken as a more nearly correct indication of the range in size in the forms of *Galerella*, which on this basis is shown to be small.

Measurements of *Galerella ochracea*, *G. sanguinea rendilis*, *G. s. orestes*, *G. s. ibeæ*, *Helogale hirtula robusta*, and *Herpestes ichneumon*

	External Measurements			
	No. of Specimens	Head and Body	Tail Vertebræ	Hind Foot (c. u.)
Galerella ochracea	7	270(245–290)	245(228–270)	55.4(50– 57)
G. sanguinea rendilis	3	311(285–333)	293(280–315)	57.3(55– 60)
G. s. orestes	5	335(312–340)	291(277–300)	65.0(62– 71)
G. s. ibeæ	4	335(320–330)	318(303–326)	62.0(58– 65)
Helogale hirtula robusta	7	265(248–286)	175(160–220)	57.0(52– 61)
Herpestes ichneumon group	6	545(533–570)	463(435–489)	97.0(91–100)

	Skull	
	No. of Specimens	Condylobasal Length
G. ochracea	6	58.5 (56.6– 60.5)
G. s. rendilis	4	64.0 (60.0– 67.5)
G. s. orestes	6	64.3 (62.0– 67.0)
G. s. ibeæ	8	65.2 (64.0– 67.0)
H. h. robusta	7	55.9 (53.4– 58.1)
Herpestes ichneumon group	6	105.4 (100.0–110.0)

Galerella ochracea ochracea (Gray)

Plate XXIII, Figures 2–4; and Text Figures 44C–46

Herpestes ochraceus Gray, 1848, Proc. Zoöl. Soc. London, p. 138. Type locality, Abyssinia.

Represented by 9 specimens, 7 of which are adult and 2 nurslings, collected as follows:

Niangara, 1 (♂ adult), November 10, 1910.

Faradje, 8 (4 ♂ adults, 2 ♀ adults, 2 nurslings), February 20, 28, March 19, October 9, 1911; August 19, 1912; January 9, February 7, 1913.

The seven adult specimens (including one alcoholic and one skeleton) conform to a general type of a minutely grizzled pattern of coloration, but they vary greatly individually in the resulting tone, ranging in general effect from isabella to tawny. The extremes are represented by

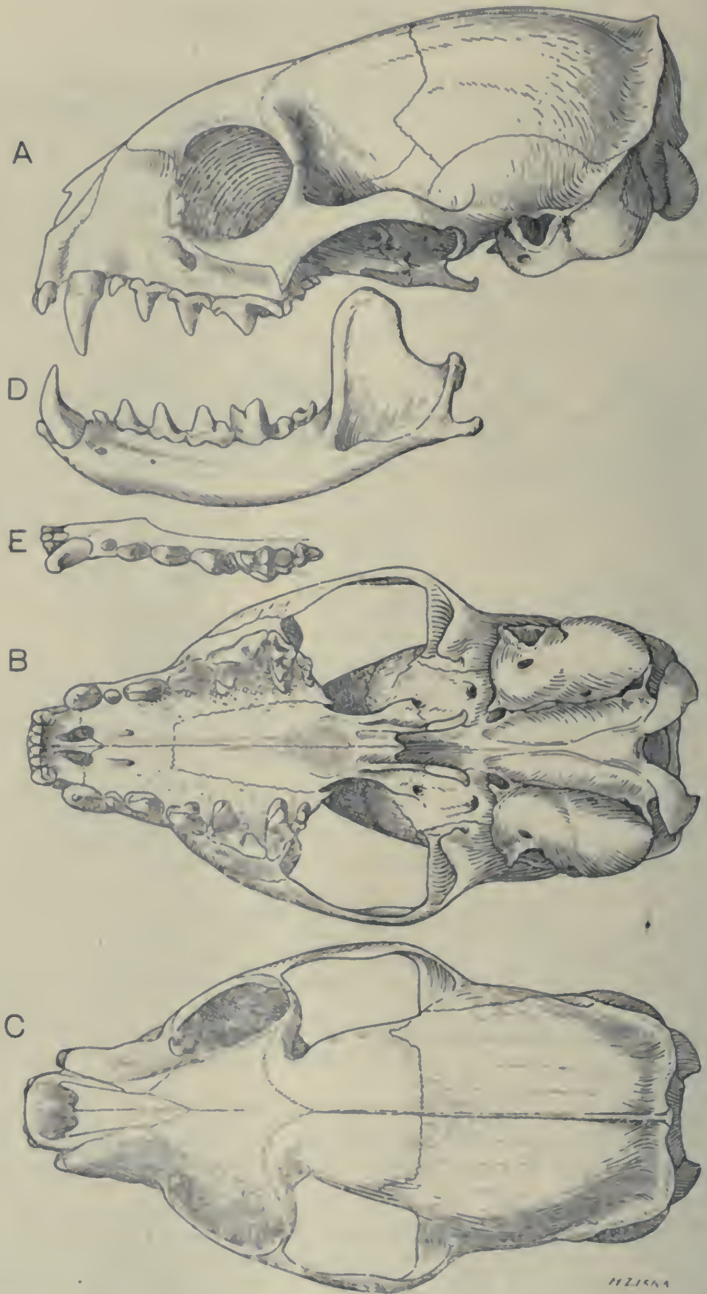

Fig. 45. *Galerella ochracea ochracea.* Skull of adult male (No. 51108). A, lateral view; B, palatal view; C, dorsal view; D, lateral view of left mandible; E, crown view of left lower dentition. × 3/2.

two specimens from Faradje, both old males, one of which was taken March 19, the other October 9. The March specimen is pale ochraceous finely grizzled with dusky, the hairs individually of the upperparts being annulated subapically with pale yellowish and black and tipped with pale yellowish; the soft underfur is ochraceous slightly darkened at the extreme base. The ochraceous underfur shows strongly through the short, close-lying, fine, soft overhair, whose subapical black ring forms the contrasting dusky surface grizzle. The head is slightly darker than the back and the light tips of the hairs are whitish, giving a grayish effect.

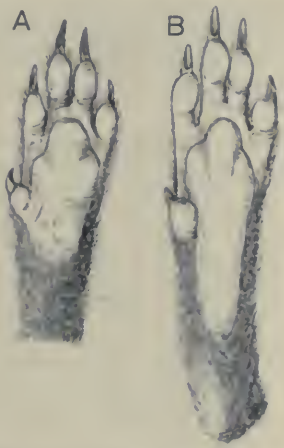

Fig. 46. *Galerella ochracea ochracea* (No. 51108). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

The tail above is like the back, with a broad, intensely black tip, preceded by a broad subapical zone of ochraceous only slightly grizzled with black. The under surface of the tail, from about the basal third to the black tip, is deep tawny ochraceous, increasing in intensity apically. The underparts are uniform deep ochraceous from the throat posteriorly, and the hairs are without annulations. The October specimen is dusky above, the hairs individually with annulations of black and pale buff and minute whitish tips. The underfur is less in quantity, pale brownish buff, darker at the extreme base, and scarcely shows at the surface of the overhair. The underparts are darker and duller and more dingy in tone. The tail shows increased intensity of ochraceous subapically. These two phases appear to be, at least in part, seasonal, as the October specimen has a shorter and more worn pelage. This supposition is strengthened by the pelage condition and coloration of other specimens taken respectively at corresponding dates.

The darkest specimen of all was taken at Niangara in November. In this the head is conspicuously gray, particularly on the sides and throat. The underfur of the upperparts is plumbeous for the basal half, pale buffy apically, and is not visible through the overhair. The tail subapically shows very little increase of fulvous, while the midline of the tail below is scarcely different in color from its lateral borders. The other specimens are variously intermediate between the above described extremes.

The two nurslings, in soft woolly pelage, have the same color pattern as the adults, and are practically indistinguishable in coloration, aside from the different effect imparted by the softness of the juvenile pelage.

Measurements of Seven Adults of *Galerella ochracea ochracea*

			External Measurements					Skull		
Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Condylo-basal Length	Zygomatic Breadth	Maxillary Toothrow (p^1-m^2)
51106	♂	Niangara	480	245	235	50	25	57.7	27.0	17.9
51108	♂	Faradje	540	285	255	57	27	59.2	30.5	17.5
51109	♂	"	495	255	240	54	24	56.6	27.6	17.2
51184	♂	"	532	289	243	54	22	—	—	—
51119	♂	"	560	290	270	54	23	60.5	30.1	18.2
51107	♀	"	524	277	247	54	22	59.7	27.0	18.1
51176	♀	"	507	279	228	55	21	57.4	27.8	17.1
Average 7 adults (5♂, 2♀)			**520**	**274**	**245**	**54.4**	**23.4**	**58.5**	**28.3**	**17.7**
Minimum			480	245	228	50	21	56.6	27.0	17.1
Maximum			560	290	270	57	27	60.5	30.5	18.2

The subjoined table of measurements indicates the range of variation in external measurements and in the principal measurements of the skull. Those of the skull agree closely with the measurements given by Pocock (1907, Ann. Mag. Nat. Hist., (7) XX, pp. 112, 113) for the *Herpestes ochraceus* group; the external measurements, taken from specimens in the flesh by the collectors, greatly exceed those given by Pocock from dry skins.

The variation in coloration, usually present in series of specimens of any of the forms of *Galerella*, leads one to suspect that when adequate material of each of the score or more forms now recognized is brought together for critical revision, many of them will be found to have no real basis.

The premolar formula in eight of the nine skulls available for examination is $\frac{4-4}{3-3}$; in the other skull, $\frac{4-4}{4-4}$, there being a minute p_1 on both sides in the lower jaw (Figs. 45 D, E).

HELOGALE Gray

Helogale GRAY, 1861, Proc. Zoöl. Soc. London, p. 308 (skull figured). Type, by monotypy, *Herpestes parvulus* Sundevall.

Helogale hirtula robusta, new subspecies

Plate XXIV, Figure 1; and Text Figures 44D, 47, 48

Type, No. 51104, ♂ adult, Faradje, Belgian Congo, March 9, 1911; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1485.

A large form of the *Helogale hirtula* group.

Type:—Dark brown above, finely grizzled with yellowish gray; head distinctly darker than back, the hairs minutely tipped with whitish; posterior half of back suffused with fulvous, due to the broad apical zone of the underfur showing more or less through the stiff overhair, the long hairs banded subapically with one or two zones of black, the extreme tips pale buff; tail above uniform with back; underparts nearly uniform pale sepia (varying in different specimens from bister to sayal brown), the extreme tips of the hairs lighter, on the throat tending to grayish; under surface of tail with a broad median fulvous band, extending from the base for the proximal half to two-thirds (in some specimens nearly to the tip, in others almost obsolete); digits of both fore and hind feet black (varying in different specimens from brownish black to intense black).

Collectors' measurements of the type: Total length, 460 mm.; head and body, 251; tail vertebræ, 209; hind foot, 59; ear, 23. (See subjoined table for measurements of additional specimens.)

Skull (type): Condylobasal length, 56.4; zygomatic breadth, 28.7; interorbital breadth, 9.8; postorbital breadth, 10.4; breadth of braincase, 25.6; length of nasals, 11.5; upper toothrow (p^2-m^2), 15.2 (with canine, 19.6); length of p^4 (inner side), 5.5, greatest transverse breadth, 3.6; transverse breadth of m^1, 4.4; length of palate, 26.6; palatal breadth (at outer edge of junction of p^4 and m^1), 18.

Represented by 10 specimens (8 males, 2 females), taken as follows:

Aba, 2 (old ♂), December 20, 1911.

Faradje, 6, including 1 skeleton (5 ♂ adults, 1 ♀ subadult), February 25–March 9, 31, 1911.

Niangara, 1 (old ♀), April 20, 1913.

Vankerckhovenville, 1 (very old ♂), August 4, 1911.

All are adult except a female from Faradje, in which the dentition is not fully developed (upper canines just in sight and milk canines still functional). The Aba and Vankerckhovenville specimens are very old, with greatly worn teeth, and the largest of the series. As indicated in

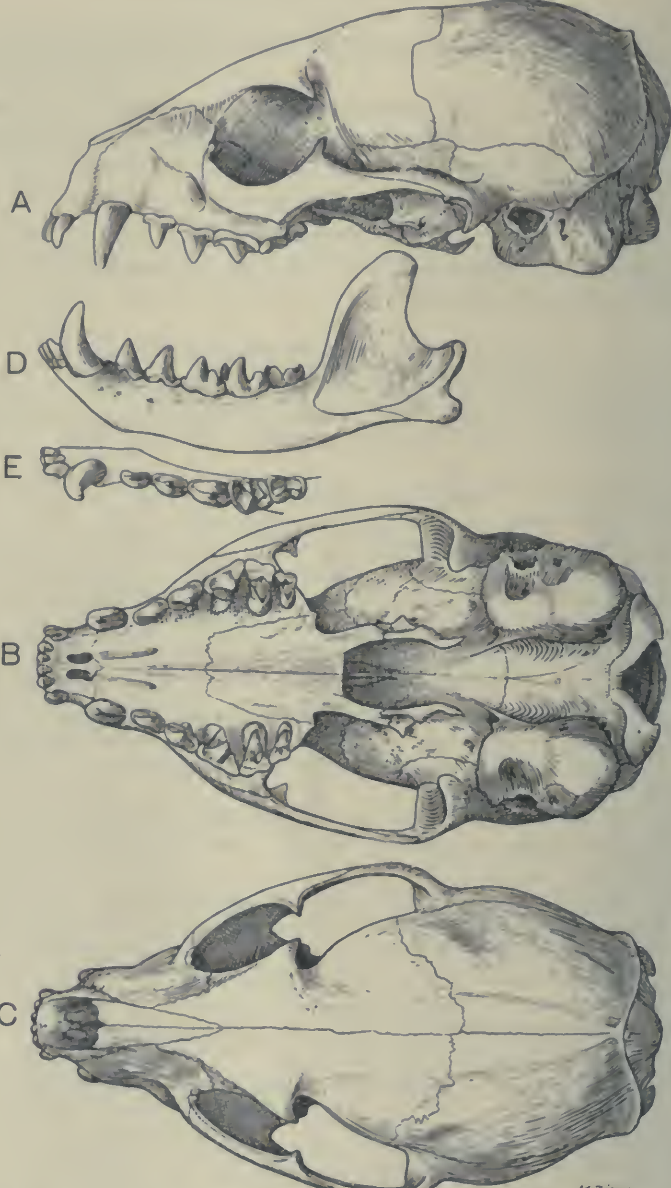

Fig. 47. *Helogale hirtula robusta.* Skull of adult male (No. 51101). A, lateral view; B, palatal view; C, dorsal view; D, lateral view of left mandible; E, crown view of left lower dentition. × 3/2.

the above description of the type, the series presents a considerable range of individual variation in color, some being darker than others with scarcely any fulvous suffusion of the underfur, while the fulvous suffusion is very strong in others, forming a striking feature of the coloration. The extremes, however, completely intergrade, and are represented by specimens taken at the same locality at practically the same date.

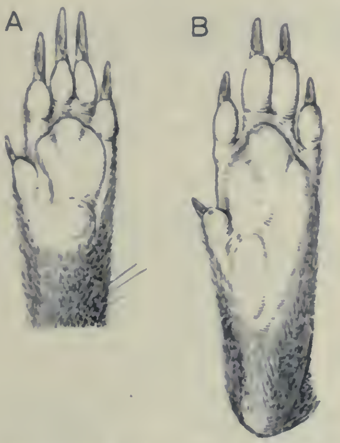

Fig. 48. *Helogale hirtula robusta* (No. 51101). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

Helogale hirtula robusta is of course nearly allied (particularly the fulvous phase) to *H. hirtula lutescens* Thomas, from Lake Rudolph, and also (the dark phase) to *H. hirtula ahlselli* Lönnberg, from the Guaso Nyiro district. A compilation of the measurements of the seventeen previously described forms of *Helogale* indicates that *robusta* is the largest of all thus far described, in both external and cranial measurements, although the type of *H. hirtula powelli* (skull length 54.5 mm.), from Italian Somaliland, approaches the average of *robusta* (55.9, with a maximum of 58.1). The subjoined table gives the range of the measurements of the *robusta* series, in which, while all are adult, the smaller specimens have the teeth unworn but in the larger ones the teeth are nearly worn down to the roots.

It is worthy of note that one of the Faradje specimens (No. 51090) has a supernumerary premolar, p^1 being fully developed on both sides, but p_1 is absent in the lower jaw, as usual.

Measurements of Nine Adults of *Helogale hirtula robusta*

		External Measurements						Skull		
Cat. No.	Sex and Age	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Condylo-incisive Length	Zygomatic Breadth	Upper Toothrow
51090	♂ ad.	Faradje	—	—	—	—	—	53.4	28.0	15.5
51101	♂ "	"	429	248	181	52	23	53.5	28.7	13.6
51102	♂ "	"	483	286	197	55	23	—	—	—
51103	♂ "	"	432	249	183	54	23	53.8	28.2	14.0
51104[1]	♂ "	"	460	251	209	59	23	56.3	28.7	14.8
51105	♂ old	Vankerckhovenville	422	262	160	56	23	56.8	—	14.5
51118	♂ "	Aba	505	285	220	61	25	57.8	31.5	14.5
51789	♂ "	"	—	—	—	—	—	58.1	32.6	15.2
51608	♀ "	Niangara	490	278	212	60	22	—	—	—
Average			**460**	**265**	**195**	**57**	**23**	**55.9**	**29.6**	**14.6**
Minimum			422	248	160	52	22	53.4	28.0	13.6
Maximum			505	286	220	61	25	58.1	32.6	15.5

MUNGOS Geoffroy and Cuvier

Mungos GEOFFROY AND CUVIER, 1795, 'Mag. Encyclop.,' II, pp. 184, 187. Type, by tautonymy, *Viverra mungo* Gmelin.

Mungos GRAY, 1864, Proc. Zoöl. Soc. London, p. 575. Type, by tautonymy, *Herpestes mungo* Desmarest = *Mungos fasciatus* Gray. Not *Mungos* Ogilby, 1835.

Crossarchus (part), of most recent authors, not of F. Cuvier.

Ariela GRAY, 1864, Proc. Zoöl. Soc. London, p. 565. Type, by monotypy, *Herpestes tænionotus* A. Smith.

Ariela POCOCK, 1916, Proc. Zoöl. Soc. London, p. 349; 1919, Ann. Mag. Nat. Hist., (9) III, p. 523.

Mungos[2] **gothneh** (Heuglin and Fitzinger)

Plate XXIV, Figures 2–4; and Text Figures 44E, 49–51

Herpestes gothneh HEUGLIN AND FITZINGER, 1866, Sitzungsb. Math. Naturw. Cl. Ak. Wiss. Wien, LIV, 1, p. 560. Kordofan.

Crossarchus gothneh THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Poko (4 specimens).

Represented by 22 specimens, mostly immature, collected as follows:

Niangara, 2 (adult, ♂ and ♀), November 30, December 16, 1910.

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[1] Type.

[2] The reasons for using *Mungos* in place of *Crossarchus* in the present connection are given in a preceding article (pp. 157, 158).

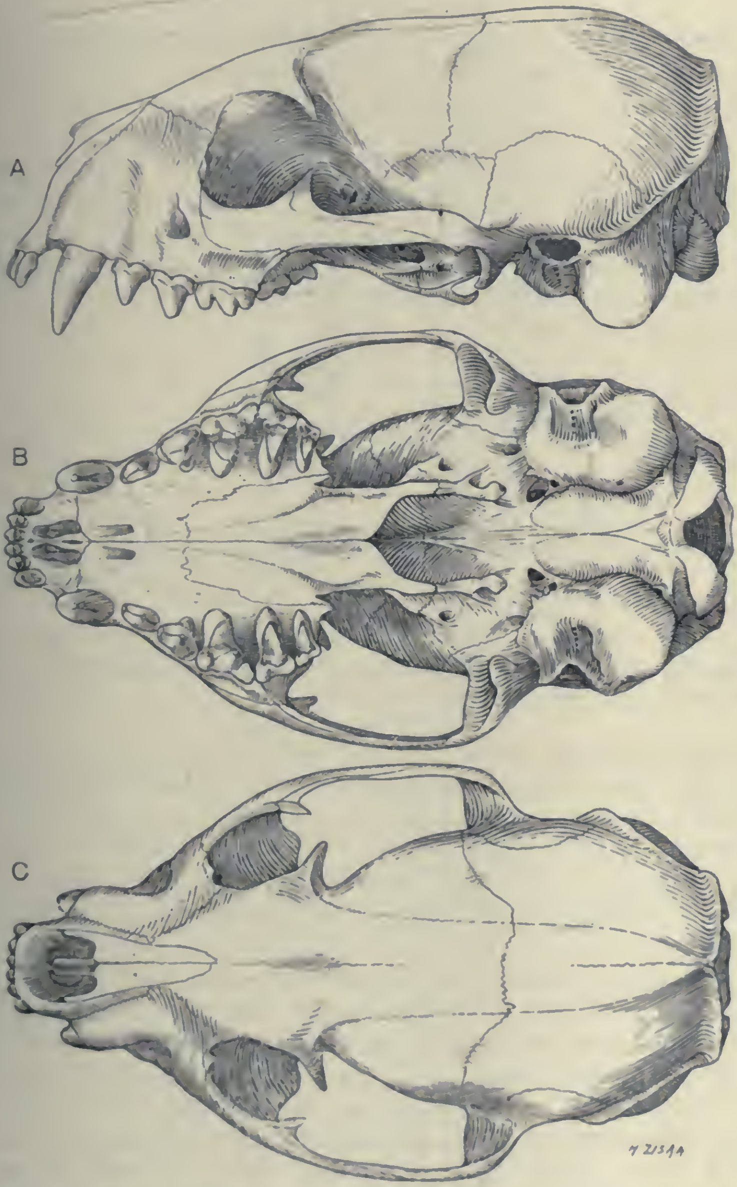

Fig. 49. *Mungos gothneh.* Skull of adult female (No. 51112). A, lateral view; B, palatal view; C, dorsal view. × 3/2.

Faradje, 19 (2 ♂ adult, 2 ♀ adult, 2 juvenile with fully developed milk dentition, 2 juvenile with partly developed milk dentition, 11 nurslings), February 11–24, March 4–18, May 8, 1911; January 19, 1912.

Akenge, 1 (♂ adult, skin and skeleton), October 3, 1913.

Collectors' measurements of 5 adults (2 ♂, 3 ♀): Total length, 519 mm. (490–553); head and body, 316 (305–333); tail vertebræ, 200 (173–228); hind foot, 68 (61–73); ear, 23 (21–25).

Measurements of 6 adult skulls (3 ♂, 3 ♀): Condyloincisive length, 62.5 (61.4–64.3); zygomatic breadth, 35.2 (32.2–37.0); maxillary toothrow (p^2–m^2), 16.8 (16.1–17.7).

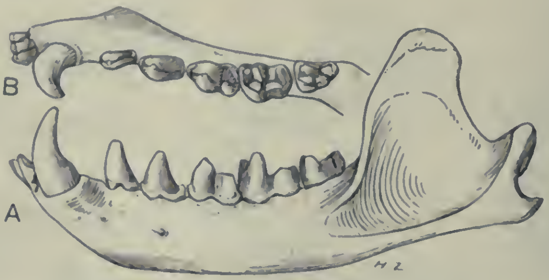

Fig. 50. *Mungos gothneh.* Adult female (No. 51112). A, lateral view of left mandible; B, crown view of left lower dentition. × 3/2.

Only about one-third of the specimens are adult; fully one-half are nurslings. The adults are all quite similar in coloration; the young specimens resemble them in pattern but the tones are much duller and the dorsal bands less sharply defined. Three of the immature specimens are marked with white below; in two there is a small oval patch on the middle of the breast, in the other a short median streak on the belly, suggesting near relationship to *Mungos zebra* of Abyssinia.

The present small series of adults seems to indicate that *Mungos gothneh* (Pl. XXIV, fig. 4) is much smaller than any of the more eastern members of the *Mungos* group, from Natal to the Red Sea, judging by the statistics of size I have been able to glean from published descriptions. The South African and East African forms, north to northern British East Africa, have an average condylobasal length of skull of 73 mm. against 62.5 mm. for the present series from northeastern Belgian Congo (maxima, respectively, 75.5 and 64.3); and a zygomatic breadth of 40 mm. against 35 mm. (maxima, respectively, 43 and 37), with corresponding differences in external measurements. Abyssinian and Somaliland forms appear to be intermediate in size be-

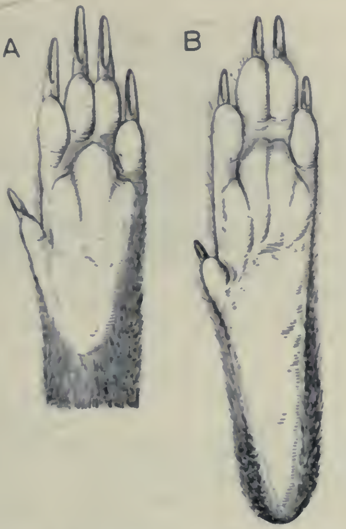

Fig. 51. *Mungos gothneh* (No. 51112). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

tween East African and Northeast Congo specimens, the latter here provisionally referred to Heuglin and Fitzinger's *Herpestes gothneh.*

CROSSARCHUS F. Cuvier

Crossarchus F. CUVIER, 1825, 'Hist. Nat. Mamm.,' V, livr. 47, February. Type, by monotypy, *Crossarchus obscurus* F. Cuvier.

Crossarchus alexandri Thomas and Wroughton

Plate XXV; and Text Figures 44B, 52–54

Crossarchus alexandri THOMAS AND WROUGHTON, 1907, Ann. Mag. Nat. Hist., (7) XIX, May, p. 373. Type locality, Banzyville, Ubangi, Belgian Congo. Five specimens.

Crossarchus alexandri THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Mawambi (2), Moera (1), Poko (1 specimen).

Represented by 66 specimens (48 adult, 18 immature), collected as follows:

Poko, 1 (♂), August 23, 1910.

Akenge, 17 (2 ♂, 5 ♀, 4 subadults, 6 nurslings), September 16, October 1–30, 1913.

Niapu, 44 (19 ♂, 25 ♀, all adult but 6), November 14–27, December 1–31, 1913; January 3, 15, 1914.

Medje, 1 (♀ adult), July 15, 1910.

Gamangui, 3 (♂ all adult), February 8, 16, 22, 1910.

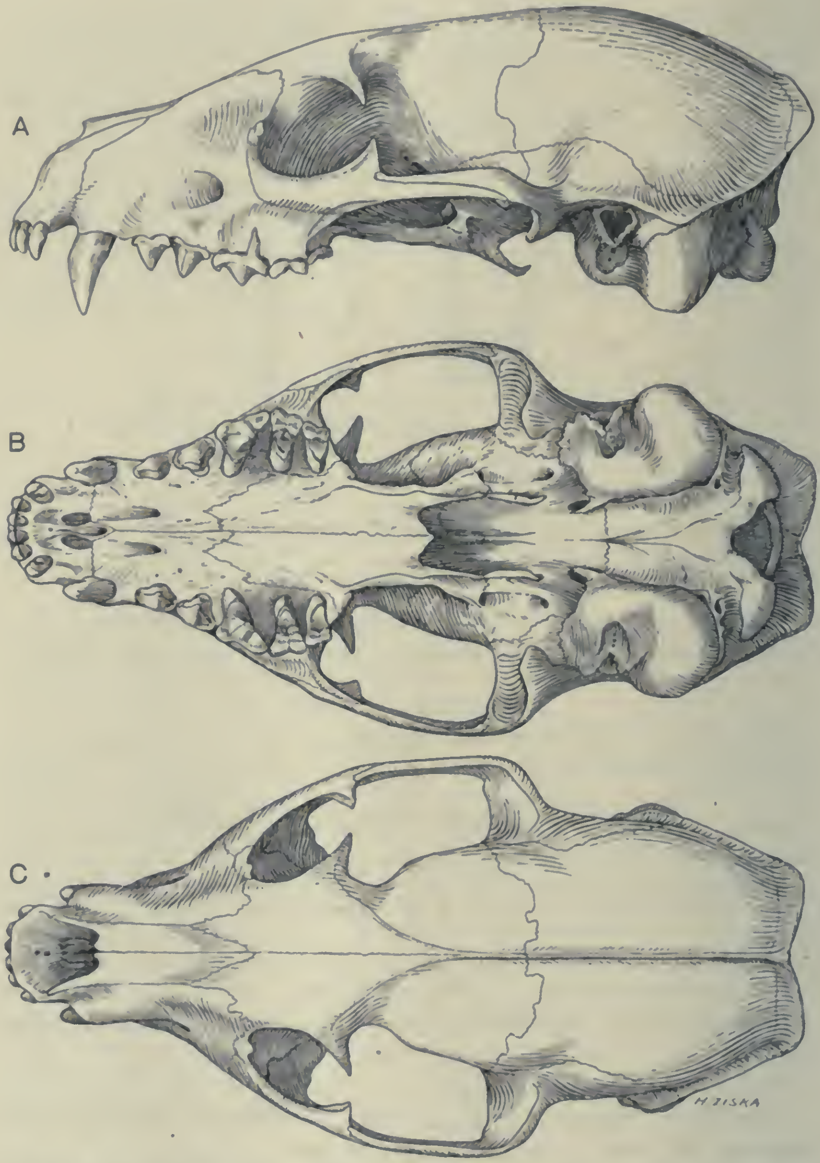

Fig. 52. *Crossarchus alexandri.* Skull of adult male (No. 51696). A, lateral view; B, palatal view; C, dorsal view. $\times \frac{5}{4}$.

Forty-eight specimens of this series of sixty-six are fully adult (Pl. XXV). Of the eighteen more or less immature four are subadult (permanent dentition fully developed but unworn, but skull and general size of animal show immaturity); in three others all the permanent teeth are present, but the canines are only about one-half to two-thirds grown; in five the entire milk dentition only is present, none of the permanent teeth being in sight; while in two others, in addition to the milk teeth, the first, or both first and second molars are in sight; these last are nurslings, in which the incisors are only half-way up and the points only of the larger cusps of the cheek-teeth are visible in the cleaned skull, but probably had not pierced the gum.

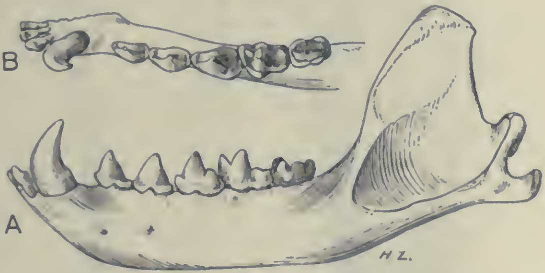

Fig. 53. *Crossarchus alexandri.* Adult male (No. 51696). A, lateral view of left mandible; B, crown view of left lower dentition. × 5/4.

No. 51095, a male, is the only specimen in which the first phase of the natal pelage is shown. In this the incisors are about half up and the canines and highest cusps of the cheek-teeth are breaking the alveoli. This is the youngest specimen of the series, and the entire upperparts, from the shoulders posteriorly, including the outer border of the ventral area and the proximal half of the tail, are thinly veiled by long silvery white hairs, through which the short brown underfur is more or less visible; the underparts, from the throat posteriorly, are dark brown with a faint reddish tone; the edge of the lips from below the eyes posteriorly, and the chin and fore part of the throat, are yellowish white, as in adults; the top of the head is faintly grayish. The occipito-nuchal crest, so conspicuous a feature in most adults, is already prominent, forming a tuft of lengthened hairs, those of the nape directed forward, and those of the crown inward.

No. 51099, a young male with the entire milk dentition well developed but with no permanent teeth in sight, is still in the brown woolly first coat, but the pelage, especially of the upperparts, has greatly increased in length from the earlier stage, and the veil of white hairs has disappeared. The underfur is yellowish gray basally, and annulated subapically with black and tipped with yellowish. The face-and-head pattern remains unchanged. This stage is represented by a series of five specimens, all approximately of the same age.

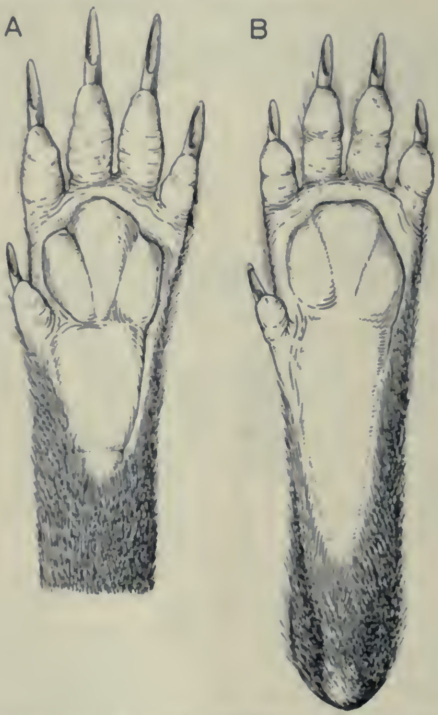

Fig. 54. *Crossarchus alexandri* (No. 51667). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

In the next stage represented, consisting of eight specimens, the natal woolly coat has been replaced by the mature pelage of adults, although some of the series are less than half-grown. No. 51660 has still the entire milk dentition, with no permanent teeth in sight, but the pelage differs in no way in texture or coloration from that of adults. The top of the head is marked by a whirl of lengthened brown hair, which passes into a conspicuous, erect nuchal crest extending to the shoulders, the hairs of which are about 50 mm. in length, or twice the length of the adjoining neck hairs on either side. They only about equal, however, the length of the pelage of the dorsal area, the coarseness and length of which

Measurements of Thirty Adult Specimens of *Crossarchus alexandri*

			Collectors' Measurements					Skull		
Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Condylo-basal Length	Zygomatic Breadth	Upper Cheek-teeth
51659	♂	Niapu	666	376	290	83	25	——	——	——
51661	♂	“	672	387	285	85	27	81.6	40.8	21.0
51662	♂	“	705	410	295	89	26	83.4	43.4	21.8
51666	♂	“	675	408	267	82	27	——	——	——
51667	♂	“	715	415	300	90	27	——	——	20.8
51671	♂	“	660	390	270	82	—	81.0	38.4	20.8
51674	♂	“	700	410	290	86	25	82.6	42.6	21.6
51686	♂	“	680	415	265	85	26	81.6	41.0	20.5
51688	♂	“	686	399	287	87	28	84.9	41.8	21.2
51689	♂	“	755	437	318	86	26	81.2	41.0	21.4
51691	♂	“	690	410	280	85	24	83.6	40.7	21.8
51695	♂	“	690	425	265	80	25	83.3	40.5	20.8
51696	♂	“	690	430	260	87	25	80.1	41.5	20.8
51697	♂	“	663	420	243	91	25	85.1	38.2	22.1
Average	**14 ♂**		**695**	**409**	**280**	**85**	**26**	**82.6**	**40.9**	**21.2**
Minimum	“		660	376	243	80	24	80.1	38.2	20.5
Maximum	“		755	437	318	91	28	85.1	43.4	22.1
51655	♀	Niapu	705	412	293	87	—	——	——	——
51661	♀	“	672	387	285	85	27	81.6	40.8	21.0
51663	♀	“	690	423	267	89	27	83.4	42.2	21.7
51665	♀	“	695	395	300	85	27	——	——	——
51668	♀	“	725	415	310	90	27	86.8	41.8	21.8
51671	♀	“	660	390	270	82	—	81.0	38.4	20.8
51675	♀	“	680	395	285	85	25	78.9	39.7	20.6
51677	♀	“	645	375	270	86	26	81.5	38.6	21.8
51678	♀	“	705	420	285	88	27	——	——	——
51679	♀	“	——	——	——	—	—	83.4	39.0	21.6
51680	♀	“	685	390	295	85	27	83.0	40.7	21.6
51682	♀	“	705	410	295	85	28	82.9	40.6	21.4
51690	♀	“	675	380	295	84	27	79.8	38.0	20.5
51693	♀	“	700	415	285	87	30	81.8	40.5	21.8
51694	♀	“	680	435	245	85	26	82.3	41.0	20.0
51698	♀	“	680	400	280	84	26	——	——	——
Average	**16 ♀**		**687**	**403**	**284**	**86**	**27**	**82.7**	**40.3**	**21.2**
Minimum	“		645	375	245	82	25	78.9	38.0	20.0
Maximum	“		725	435	310	90	30	86.8	42.2	21.8

are striking features of the species. This crest, Mr. Lang informs me, is a conspicuous feature of the animal in life.

Messrs. Thomas and Wroughton, in their description of this fine species, refer to the variability of the animal, "both in colour and in the condition of its pelage, though this latter may be a question of season." They cite a young example which is "absolutely without the long hairs characteristic of two of the Alexander-Gosling specimens, while a third is in an intermediate condition." Thus three of the five specimens examined by these authors were in abnormal pelage. In the present series of nearly sixty specimens old enough to be in adult pelage only one is in abnormal pelage, in which the animal is clad only in its coat of underfur, as in the young specimen cited by Thomas and Wroughton. The adults are exceptionally uniform in coloration and in condition of pelage. A few specimens differ from the average in darker coloration, in consequence of the extreme shortness of the light hair-tips above and their almost entire absence on the midline below. They are fully connected by intermediates with the average condition. The darker general tone thus imparted is a purely individual feature, unconnected with season. Nearly all were taken during the months of October, November, and December.

The preceding table of measurements of exclusively fully adult specimens indicates the range of variation to be expected in a large series from a single locality.

Ichneumia I. Geoffroy

Lasiopus I. Geoffroy, 1835, in Gervais, 'Résumé des leçons de Mammalogie, professées au Museum de Paris, l'année 1835,' I, p. 37. Type, by monotypy, *Herpestes albicaudus* G. Cuvier. Preoccupied by *Lasiopus* Dejean (1833) in Coleoptera.

Ichneumia I. Geoffroy, 1837, Ann. Sci. Nat., Paris, (2) VIII, October, p. 251; 1839, Mag. de Zool., pp. 3 and 13 of text to Pls. xi-xvi. New name to replace *Lasiopus*, preoccupied.

Similar in size, character of pelage, and most cranial characters to typical forms of *Herpestes*, and with the same dental formula (teeth 40), but soles of feet furred instead of bare, frontal region of skull more elevated and expanded, the dentition much heavier, especially p^4 and the molars of both jaws.

Ichneumia leucura ibeana (Thomas)

Plate XXVI; and Text Figures 55–57

Herpestes albicaudus ibeanus Thomas, 1904, Ann. Mag. Nat. Hist., (7) XIII, June, p. 409. Type locality, Athi-ya-Maui, Mombasa-Uganda Railway, British East Africa.

? *Mungos albicauda* THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Poko (1 specimen).

Ichneumia albicauda ibeana HOLLISTER, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, p. 130.

Represented by 8 specimens (5 adult, 3 immature), collected as follows:

Faradje, 5 (2 skins with skulls, 3 skins without skulls, all adult), April 15, December 31, 1911; February 17, 1913.

Niangara, 3 (2 ♂ subadult, 1 nursling), April 19, June 5, 1913.

Collectors' measurements of 3 adult males from Faradje:

Cat. No.	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51594	960	560	400	120	40
51595	990	580	410	120	43
51596	1080	620	460	130	40

Only two of the skulls of these specimens are available for measurement—Nos. 51594 and 51595. No. 51594 is very old, with the teeth greatly worn, the orbits closed, and the cranial sutures wholly obliterated; in No. 51595 (Figs. 55 and 56) the teeth are unworn, the orbits not fully closed, and all the cranial sutures open except the median frontal and parietal. Greatest length (No. 51594) 111.2, (No. 51595) 106.0; condylobasal length, 110.8, 107.8; palatal length, 62.0, 63.0; zygomatic breadth, 57.5, 55.5; breadth at p^4, 36.5, 33.0; least interorbital breadth, 21.3, 20.0; postorbital constriction, 22.2, 21.0; breadth of braincase, 36.3, 33.9; upper cheek-teeth (c-m^2), 43.3, 39.0; p^1-m^2, 35.2, 32.5; length of p^4, 10.0, 9.6; greatest transverse breadth of p^4, 7.0, 6.8; m^1, 5.8×9.0, 6.0×8.5; m^2, 4.3×7.6, 4.3×7.3.

Although the five Faradje specimens are all adult and the three from Niangara are all immature, they seem unquestionably referable to the same form, although not satisfactorily comparable, owing to difference in age. The five Faradje specimens vary greatly individually in the amount of white in the tail. In one the apical half is white; in another only the apical third is white; in a third the tail is merely grizzled with white; in the other two the tail is superficially blackish, the hairs having only narrow subapical and subbasal zones of white, not evident at the surface except ventrally. The two semi-adult Niangara specimens have the apical half of the tail clear white (Pl. XXVI, fig. 1).

One of the Niangara specimens is a nursling (probably about two or three weeks old) in first pelage. The ventral surface is thinly clothed and dark brown; the rest of the body, the limbs (except the toes), and

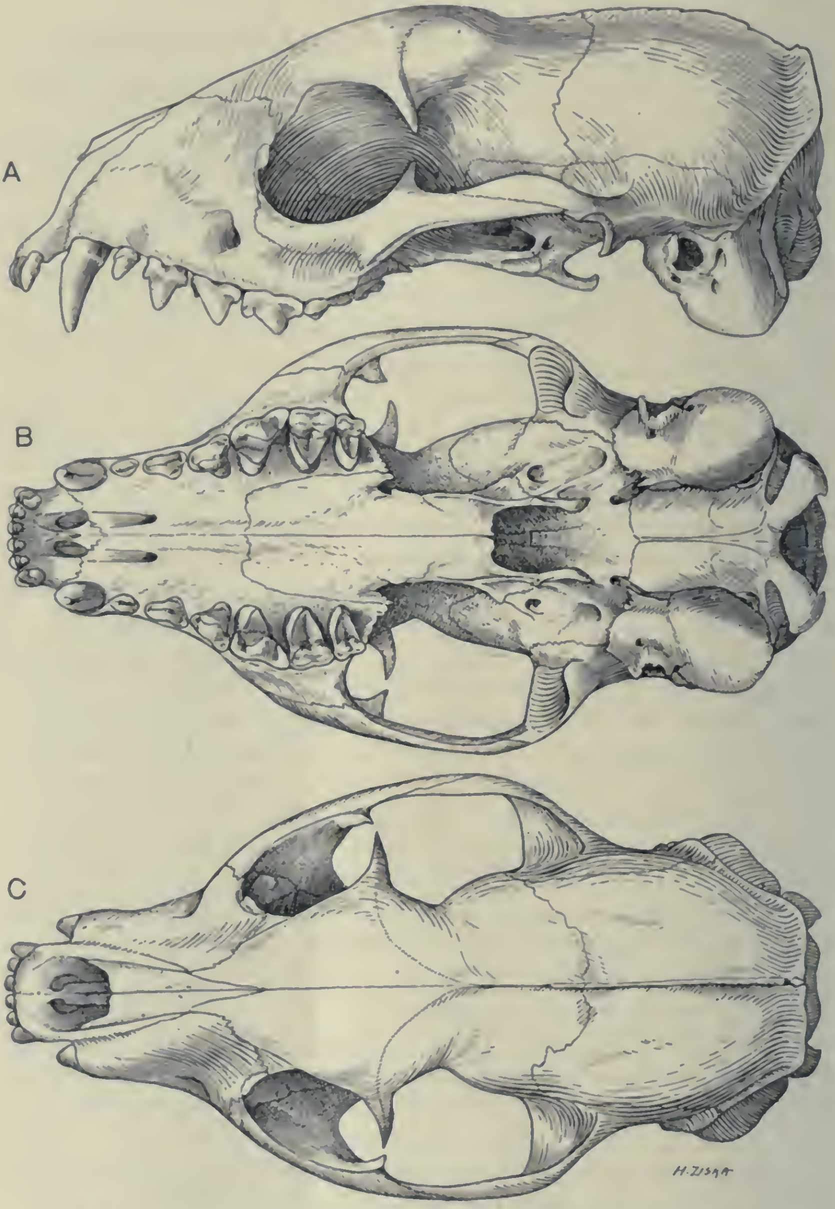

Fig. 55. *Ichneumia leucura ibeana.* Skull of adult male (No. 51595). A, lateral view; B, palatal view; C, dorsal view. Natural size.

the tail (except the tip) are pale buff, the hairs dusky at base, the dusky portion showing at the surface on the middle of the back, thus giving in places a dingy effect; the nose is blackish, passing into dark brown on the forehead and sides of the head; the toes and tip of the tail are also blackish.

The skulls of the specimens from Faradje agree in all essential details with a series of four skulls from the Athi district, British East Africa. In general coloration both the Faradje and Niangara specimens are much darker than the series of *Herpestes albicaudus ibeanus* Thomas, to which subspecies they are referred with much reservation, as not only are they much darker but the geographical conditions of the two regions point to their probable subspecific differentiation. As, however, the type locality of I. Geoffroy's *Ichneumon albescens* is Sennar, the Faradje form may be referable to *albescens*, a point indeterminable without Sennar specimens for comparison.

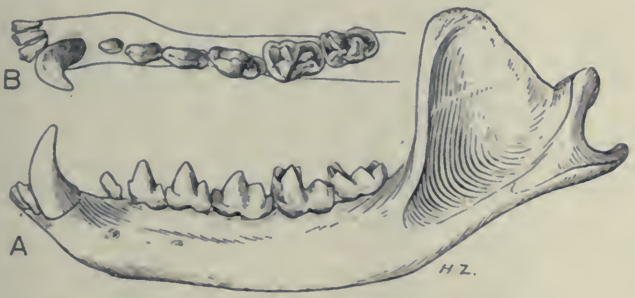

Fig. 56. *Ichneumia leucura ibeana.* Adult male (No. 51595). A, lateral view of left mandible; B, crown view of left lower dentition. Natural size.

Geoffroy's *I. albescens* has usually been synonymized with the Abyssinian *leucurus* of Ehrenberg, and the latter with *albicaudus* of G. Cuvier from Senegal. As it does not appear to me probable, on geographic as well as on other grounds, that *leucurus* and *albicaudus* can be specifically identical, I prefer to employ *leucurus* for the eastern group. It may be noted that, with few exceptions, it has been customary heretofore to refer all forms of *Ichneumia*, from Cape Colony to Abyssinia, Sudan, northern Angola and Senegal, to Cuvier's *albicaudus*.

XENOGALE J. A. Allen

Xenogale J. A. ALLEN, 1919, Journ. Mammalogy, I, No. 1, November 28, p. 26. Type, by original designation, *Xenogale microdon*.

Toes 5–5; soles and palms furred; dental formula, relative size and general structure of the teeth as in *Herpestes* (*s.s.*); skull relatively short and broad, post-palatal region especially so; postorbital constriction deep and close behind the post-orbital processes; braincase short, proportioned about as in *Ichneumia*, very different in form from the braincase of *Herpestes;* tail short and thick, as in *Ichneumia* and *Atilax*, in contrast with the long slender tail of *Herpestes*, in which the heavily haired portion is restricted to the basal third.

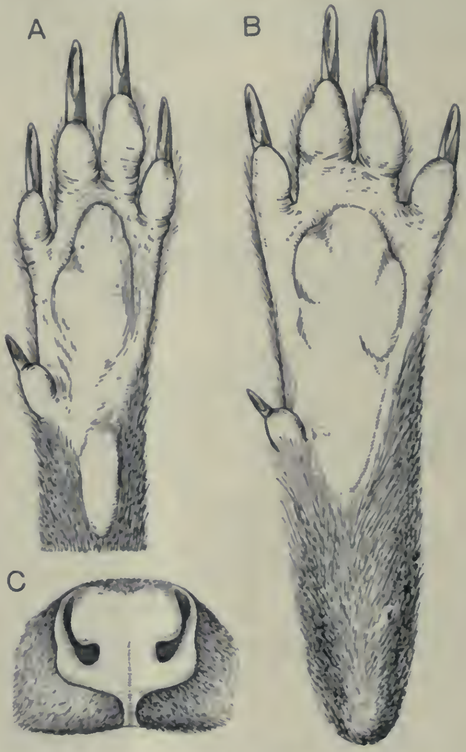

Fig. 57. *Ichneumia leucura ibeana* (No. 51595). A, palmar surface of left fore foot; B, plantar surface of left hind foot; C, rhinarium. Natural size.

Xenogale presents a singular combination of characters. Externally it strongly resembles *Atilax*, particularly in the texture and coloration of the pelage, and in the field was mistaken for *Atilax macrodon*, but in cranial characters and in dentition the two forms present little similarity. It resembles *Ichneumia* in external form, in its long heavy overhair, and in having the palms and soles furred, thus differing in this latter respect from both *Herpestes* and *Atilax*. It has the light and rather weak dentition of *Herpestes*, but the skull is relatively much shorter, broader and heavier than in the latter, with the postpalatal region correspondingly shorter and wider (Figs. 41, 58). The short, thick tail also contrasts strongly with the attenuate tail of *Herpestes*.

Xenogale microdon J. A. Allen

Plate XXVII; and Text Figures 58–60, 61A-B

Xenogale microdon J. A. ALLEN, 1919, Journ. Mammalogy, I, No. 1, Novembe 28, p. 27.

Type, No. 51625, ♂ adult, Niapu, Belgian Congo, December 4, 1913; Herbert Lang and James P. Chapin, American Museum Congo Expedition. Orig. No. 2194.

A small-toothed form with a general external resemblance to the *Atilax* group.

Upperparts of body with the overhair black broadly annulated with rufous, giving a grizzled effect of deep black and ochraceous orange; the individual hairs are light at base passing into black, the outer half black ringed and tipped with ochraceous or wholly black; underfur pale buff, darker at extreme base; tail like the back at base, becoming lighter apically without distinctive change (either to black or white) at tip, the hairs individually buff at base, broadly ringed with black near the middle and subapically ringed with whitish; limbs uniform brownish black to intense black (in different individuals); head distinctly lighter than body, the hairs short and conspicuously tipped with whitish, giving a grizzled, grayish effect; ventral area similar to the back but more suffused with rufous which prevails over the black; foreneck from the axillar line to lower part of the throat blackish, the hairs conspicuously tipped with whitish, giving a grizzled effect; chin, sides of head and top of nose with a brownish tone, the hairs extremely short; palms and soles[1] as in *Ichneumia*.

Collectors' measurements of type: Total length, 895 mm.; head and body, 510; tail vertebræ, 385; hind foot, 105; ear, 36.

Skull of type, greatest length, 107.0; condylobasal length, 105.0; basal length, 100.0; zygomatic breadth, 59.0; postorbital constriction, 18.9; width of braincase, 38.5; mastoid breadth, 41.0; across p^4-p^4, 34.5; palatal length, 60.0; upper toothrow (c-m^2), 38.2; length of p^4 outside, 10.7.

The type is an old male with strongly developed sagittal and lambdoidal crests and slightly worn teeth (Figs. 58 and 59). The tail appears to have been slightly mutilated at the tip in life, and thus the total length and tail length given above are less than the normal.

This species is represented by 16 specimens (9 adults, 7 nurslings), collected in the Rain Forest region, as follows:

Akenge, 4 (all ♂, 3 adult, 1 subadult), October 14, 22, 1913.

Niapu, 4 (1 ♂, 3 ♀, all adult), November 10, December 4, 1913; January 17, 1914.

Medje, 6 (1 ♀ adult, 5 nurslings), March 10, October 5, 1910.

Avakubi, 2 (nurslings), November 27, 1909.

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[1] In the original description (*loc. cit.*, p. 27, third line from bottom of the technical description), "palms and soles bare as in *Ichneumia*" should read "palms and soles as in *Ichneumia*."

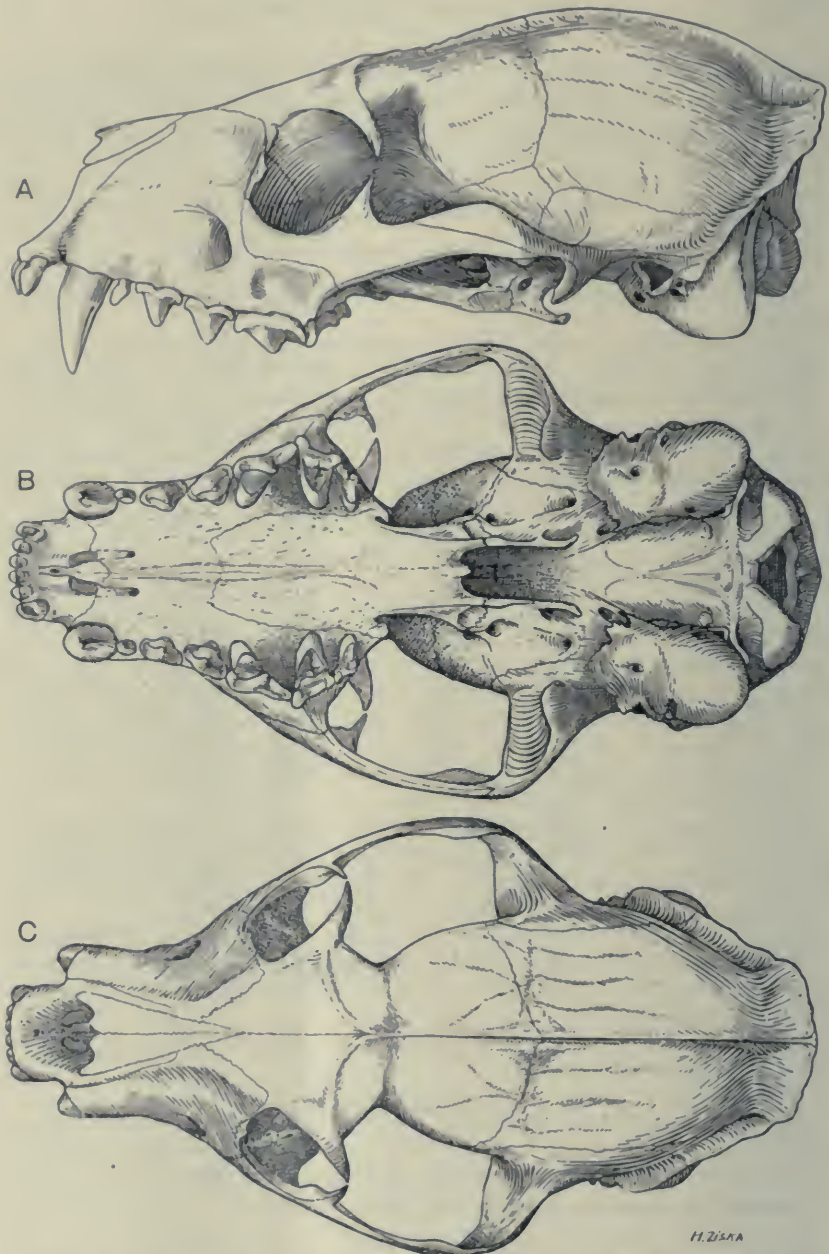

Fig. 58. *Xenogale microdon*. Type skull, adult male (No. 51625). A, lateral view; B, palatal view; C, dorsal view. Natural size.

The seven nurslings (two from Avakubi, a locality otherwise unrepresented in this series, and five from Medje, represented also by an adult female) differ markedly in coloration from the Niangara *Ichneumia* nursling, being very much darker throughout. They are also all several weeks older, with the soft juvenile pelage considerably more developed. Making due allowance for the difference in age and the consequent greater length of the pelage, the present series obviously represents a much darker form, the pelage being everywhere dull drab-brown with the extreme tips of the hairs light buffy, scantily veiling and lightening superficially the general dark tone. The front of the head to somewhat posterior to the eyes is blackish, as are the feet except for a few light-tipped hairs.

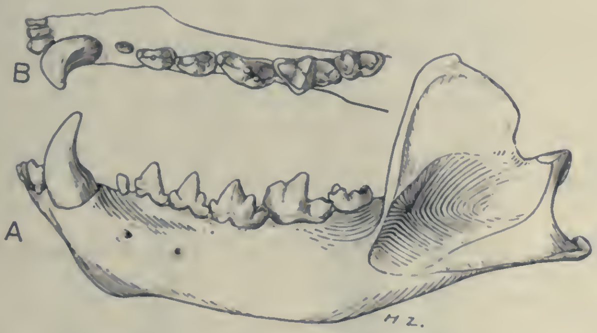

Fig. 59. *Xenogale microdon*. Type, adult male (No. 51625). A, lateral view of left mandible; B, crown view of left lower dentition. Natural size.

Three of the Medje specimens are from the same litter, but in one interesting feature they are remarkably individualistic. In one the hair of the upperparts lies smoothly and is all directed backward, being thus wholly normal in position. In another the hair posterior to the shoulders also is normal in position except for a conspicuous hair-whirl at the left hip. The other has the hair of the whole dorsal area abnormally disposed from the head posteriorly. Anteriorly is a semicircular whirl, convex posteriorly, extending from the base of the right ear to the base of the left ear, the hairs forming a crest, those of the right side of the nape and across the front of the shoulders being reversed, or directed forward and to the left over a broad area. From this broad transverse whirl or crest, a median spinal crest extends down the back to the hips and then turns sharply to the left and ends at the base of the tail. There is a third and very large transverse crest over the left scapula region

External Measurements of *Xenogale microdon*

Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
51621	♂	Akenge	1010	585	425	100	38
51625[1]	♂	Niapu	895	510	385	105	36
51624	♀	"	990	565	425	100	34
51637	♀	"	813	443	370	100	38
Average			**927**	**526**	**401**	**101**	**36.5**

Measurements of Five Skulls of *Xenogale microdon*

Cat. No.	Sex and Age	Locality	Greatest Length	Condylobasal Length	Palatal Length	Zygomatic Breadth	Least Interorbital Breadth	Postorbital Constriction	Breadth Braincase	Breadth across p^4
51616	♂[2]	Akenge	97.5	96.8	52.0	46.2	17.7	19.7	36.3	32.0
51621	♂ ad.	"	114.6	110.6	63.7	56.8	—	16.6	38.0	34.7
51624	♀ "	Niapu	107.0	105.9	56.5	54.4	20.7	15.7	37.6	31.6
51625[1]	♂ "	"	107.0	105.0	60.0	59.0	20.6	18.9	38.5	34.5
51637	♀ "	"	105.7	102.6	54.4	53.4	22.3	18.3	36.2	32.8
Average	**4 ad. (2♂, 2♀)**		**106.4**	**106.4**	**58.4**	**56.4**	**21.2**	**17.5**	**37.6**	**33.4**

Measurements of Upper Teeth of *Xenogale microdon*

Cat. No.	Sex and Age	c-m^2	p^1-m^2	p^4	m^1	m^2
51616	♂[2]	36.4	29.2	10.6×6.5	4.7× 9.7	3.2×6.0
51621	♂ ad.	40.6	33.1	9.5×5.7	5.0×10.2	3.1×6.4
51624	♀ "	38.8	30.9	9.8×5.9	5.2× 9.0	2.8×6.0
51625[1]	♂ "	38.2	31.1	10.7×6.4	5.6× 9.5	3.0×6.4
51637	♀ "	36.0	30.1	10.1×5.6	5.0× 8.9	3.0×5.7
Average 4 ad. (2♂, 2♀)		**38.4**	**31.3**	**10.0×5.9**	**5.2× 9.4**	**3.0×6.1**

Measurements of Lower Teeth of *Xenogale microdon*

Cat. No.	Sex and Age	c-m_2	p_1-m_2	p_4	m_1	m_2	Length of m_1 and m_2
51616	♂[2]	40.8	34.4	7.1×3.9	9.4×4.8	5.6×3.8	15.4
51621	♂ ad.	46.5	36.8	7.5×3.8	9.5×4.7	5.8×4.0	15.7
51624	♀ "	43.9	35.7	7.5×3.8	9.4×4.5	5.4×3.8	14.7
51625[1]	♂ "	48.8	35.9	7.7×3.6	9.2×4.8	6.1×4.0	15.1
51637	♀ "	42.1	35.0	7.5×3.7	9.1×4.6	5.4×3.6	14.5
Average 4 ad. (2♂, 2♀)		**45.3**	**35.8**	**7.5×3.7**	**9.3×4.6**	**5.7×3.8**	**15.0**

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[1] Type.

[2] Sutures of skull still distinct, but permanent teeth all fully developed except canines, the tips of which are excluded for 2 to 4 mm., but the milk canines are still functional and firmly implanted behind their successors.

formed by the reversed or anteriorly directed hairs behind the shoulder. There is a faint duplication of this on the right shoulder where the hairs are also directed forward. It is evident that this arrangement of the hair of the upperparts could not have been produced by any manipulation of the skin in its preparation as a specimen, and I am assured by Mr. Lang, who kept the specimens alive for observation, that this astonishing arrangement of the hair was the same in life as it is in the made-up specimens.

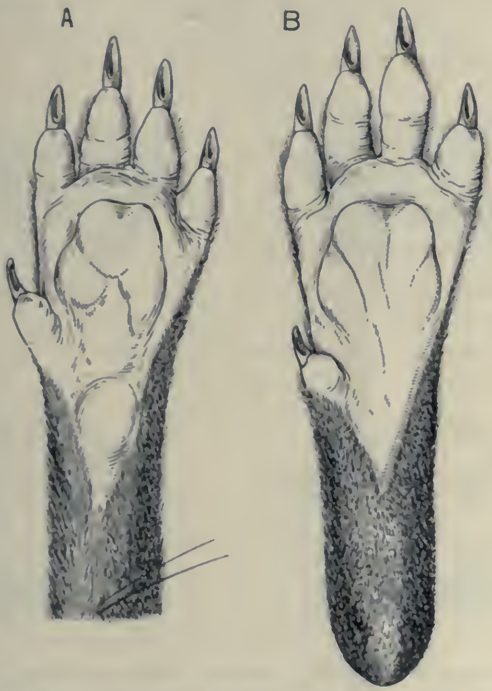

Fig. 60. *Xenogale microdon* (No. 51637). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

Atilax F. Cuvier

Herpestes (part) of most earlier authors; *Mungos* (part) of most authors since 1907.[1]

Atilax F. Cuvier, 1826, 'Hist. Nat. Mamm.,' livr. 54, June. (Cf. *antea*, pp. 169, 173). Type, by monotypy, the Vansire of F. Cuvier = *Herpestes paludinosus* G. Cuvier.

Atilax Pocock, 1916, Proc. Zoöl. Soc. London, p. 350, and pp. 349–374, passim, with text figs. of ear, vibrissæ, rhinarium, feet and anal glands. Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, p. 126.

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[1] Cf. Thomas, 1907, Ann. Mag. Nat. Hist., (7) XIX, January, p. 119, footnote.

Athylax Gray, 1864, Proc. Zoöl. Soc. London, p. 556.

Genotype (by monotypy), Vansire, F. Cuvier (not of Buffon and Daubenton) = "*Atilax vansire* F. Cuvier" auct. = *Herpestes paludinosus* G. Cuvier. (See above, pp. 167, 173, for a historical account of F. Cuvier's Vansire and the genus *Atilax*.)

Skull relatively broad, short and heavily ossified; zygomatic breadth about 60 per cent of the condylobasal length; frontal region elevated and expanded (as in *Ichneumia*); postorbital constriction deep; palatal tube long and narrow, its width about 65 per cent of the length (about 86 per cent in *Herpestes* and *Ichneumia*); teeth heavily developed; premolars $\frac{3-3}{3-3}$, teeth 36 (premolars $\frac{4-4}{4-4}$ and teeth 40 in *Herpestes* and *Ichneumia*). Pelage soft, thick and long; palmar and plantar surfaces of feet naked as in *Herpestes* (furred in *Ichneumia* and *Bdeogale*). Toes free (not joined by membranes as in *Herpestes*, *Ichneumia* and *Bdeogale*).

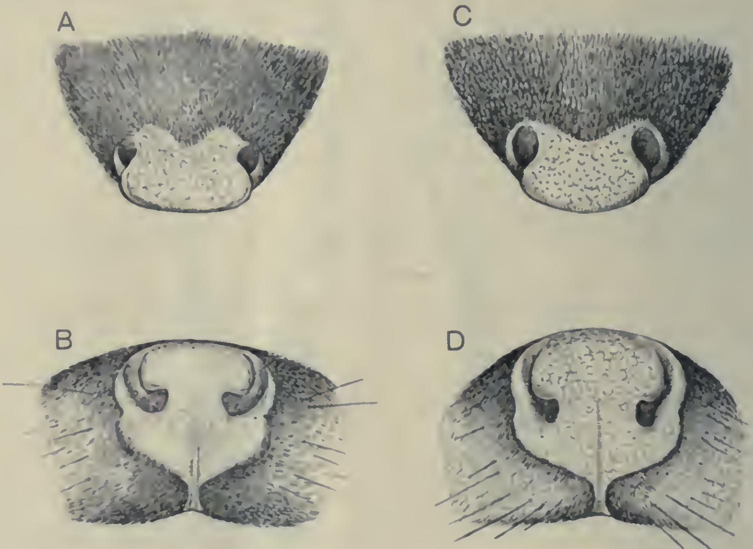

Fig. 61. Rhinarium. A, dorsal view of *Xenogale microdon* (No. 51637); B, front view of same; C, dorsal view of *Atilax macrodon* (type, No. 51629); D, front view of same. Natural size.

Atilax is the proper generic designation of the *Herpestes paludinosus* group of mongooses, which ranges throughout the greater part of Africa south of the Sahara. The half dozen forms at present recognized have heretofore usually been referred to *Herpestes* (= *Mungos* auct. recent., not *Mungos* Geoffroy and G. Cuvier), most of them as subspecies of *H. paludinosus* G. Cuvier. The forms of *Atilax* appear to vary but little in size, the condylobasal length of the skull, according to descriptions, ranging from 102 to 115 mm. The number of premolars appears to be practically constant; in a series of twenty-one skulls in the present Congo collection there is not an exception to the premolar formula of $\frac{3-3}{3-3}$.

Atilax robustus Gray

Plate XXVIII, Figure 1

Athylax robustus GRAY, 1864, Proc. Zoöl. Soc. London, pp. 558–560, text figs. of skull, p. 559 (palatal and lateral views). Type locality, White Nile, Africa.

Herpestes galera var. *robustus* THOMAS, 1882, Proc. Zoöl. Soc. London, pp. 72–74 (part). Gray's type of *robustus* only.

Represented by 4 specimens, an adult male (Pl. XXVIII, fig. 1) and female, a half-grown male, and a nursling, all taken at Faradje, April 22, 1911; March 8, December 26, 1912; January 23, 1913.

These specimens agree well with the original description of the type of *robustus* ("brown, very minutely punctured"), being nearly uniform reddish brown both above and below, passing into grayish brown on head and neck, and slightly darker on the middle of the back than on the sides and underparts. The long overhair is subapically annulated broadly with black and white, with conspicuously long reddish tips, which give the prevailing reddish brown tone to the pelage.

Collectors' measurements of the two adults: Total length, ♂ 870, ♀ 860; head and body, 530, 520; tail vertebræ, 340, 340; hind foot, 110, 108; ear, 34, 33.

Skull, total length, ♂ 102.2; zygomatic breadth, 62; upper toothrow (p^2-m^2), 29.

The type locality of *Athylax robustus* Gray is "White Nile," without further specification. Faradje is near the border of the White Nile drainage, and this species was the only *Atilax* there taken. On the other hand, no individuals of this species were found at the Ituri localities where the dark form described below was common (Pl. XXIX).

Atilax macrodon, new species

Plates XXVIII, Figure 2; XXIX; and Text Figures 61C–D, 62–64

Type, No. 51629, ♂ adult, Niapu, Belgian Congo, December 15, 1913; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 2294.

General color above blackish brown, darkest along middle of back; tail black; sides and underparts browner, with a faint rufous tone; head lighter, with a more or less grayish tone, due to the extreme tips of the hairs being whitish or pale yellowish. The overhair of the middle of the back, from the shoulders to the base of the tail, and also the tail hairs are long, stiff, and entirely black; on the head, sides of the neck and the foreneck the hairs are short, rigid, and minutely tipped with pale rufous, giving a general brownish effect, as is also the case with the long hairs of the flanks

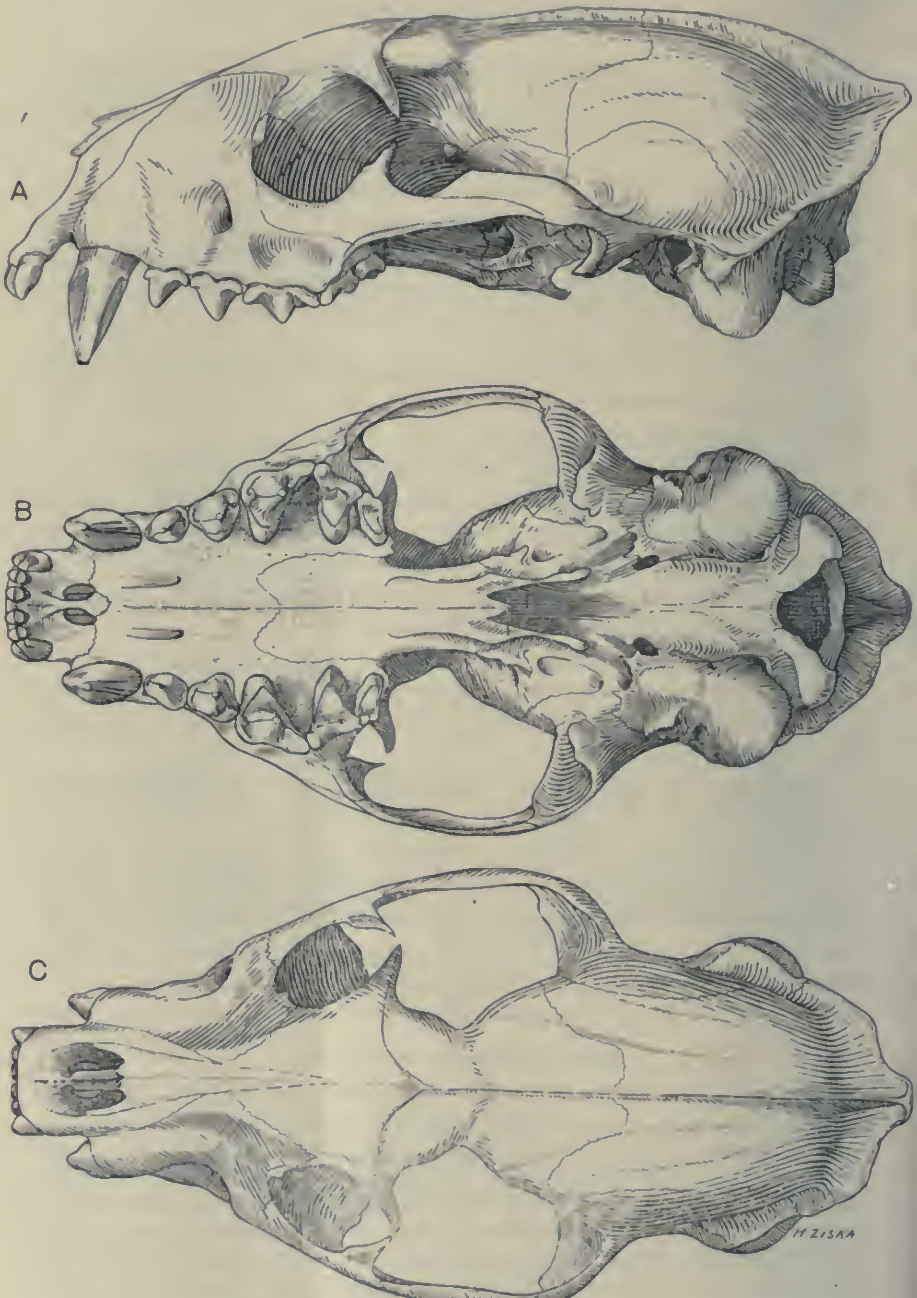

Fig. 62. *Atilax macrodon.* Type skull, adult male (No. 51629). A, lateral view; B, palatal view; C, dorsal view. Natural size.

and ventral area. Underfur thick; brownish gray. In many specimens the minute tipping of the hairs is much lighter on the head and sides of the neck, producing a grayish rather than rufous effect. Fore limbs dark brown; hind limbs darker, becoming nearly black on the feet.

Seen at a little distance or in a dull light the general color effect is dull brownish black, varying in some specimens to black; on close inspection or in strong direct light the minute rufous tipping of the hairs gives a slight rufous tone to the flanks and underparts and in exceptional specimens also to the back.

Collectors' measurements of the type: Total length, 855 mm.; head and body, 525; tail vertebræ, 330; hind foot (c. u.), 112 (s. u. 107); ear, 34.

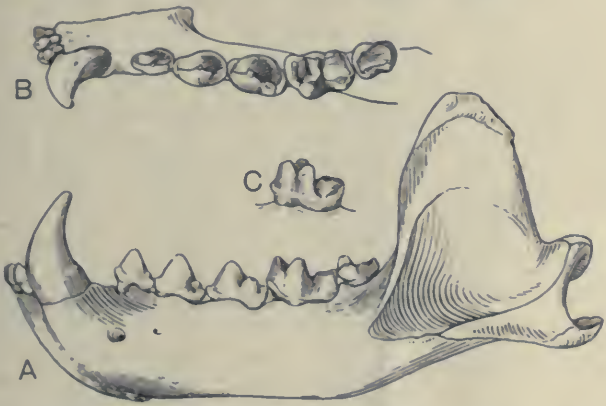

Fig. 63. *Atilax macrodon*. Type, adult male (No. 51629). A, lateral view of left mandible; B, crown view of left lower dentition; C, lingual view of first lower molar. Natural size.

Skull (type; Figs. 62 and 63), total length, 116.8; condylobasal length, 108.8; palatal length, 66.1; zygomatic breadth, 60; breadth at base of canines, 26.4; breadth at base of incisors, 14.6; interorbital breadth, 21.7; tip to tip of postorbital processes, 37.4; postorbital constriction, 15.0; breadth of braincase, 38.4; mastoid breadth, 41.8; outside breadth of palatal tube, 10.5; length of palatal tube (to tip of pterygoids), 26.5; upper toothrow (including canine), 40.7; upper toothrow (p^2-m^1) 31.2; p^4, outside length, 10.2, oblique inside length, 12.2, greatest transverse diameter, 8.6; length of mandible (symphysis to tip of angular process), 75.8; height, angle to condyle, 14.6; height of coronoid process (at posterior border) 36.4; length of toothrow (p_2-m_2), 35.4; toothrow (including canine), 47.1; m_1, 9.8×6.3; m_2, 6.1×5.5.

Represented by 17 specimens (9 males, 12 females, all but 3 adult), collected as follows:

Akenge, 2 (1 ♂, 1 ♀, both adult), October 15, 29, 1913.

Medje, 2 (♂ juvenile), August 31, October 10, 1910.

Niapu, 13 (4 ♂, 9 ♀, all adult but 1), December 6–30, 1913; January 3, March 3, 1914.

Measurements of Twelve Adult Specimens of *Atilax macrodon*

			Collectors' Measurements					Skull		
Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Condylo-basal Length	Zygomatic Breadth	Upper Cheek-teeth
51619	♂	Akenge	850	500	350	115	35	105.4	58.5	29.8
51625	♂	Niapu	895	510	385	105	36	105.6	59.3	29.1
51626	♂	"	845	510	335	108	36	106.5	60.6	29.7
51627	♂	"	855	510	345	118	34	104.5	61.7	29.3
51629[1]	♂	"	855	525	330	112	34	108.3	59.9	31.4
51630	♂	"	845	490	355	115	35	——	——	——
Average	**6 ♂**		**858**	**508**	**350**	**112**	**35**	**106.1**	**60.0**	**29.9**
Minimum	"		845	490	330	105	34	104.5	58.5	29.1
Maximum	"		895	525	385	118	36	108.3	61.7	31.4
51623	♀	Akenge	790	485	305	105	32	——	——	——
51631	♀	Niapu	850	450	400	115	33	103.0	59.4	28.5
51633	♀	"	830	510	320	109	38	104.1	59.1	28.9
51634	♀	"	860	493	367	112	38	103.8	61.7	28.3
51635	♀	"	890	525	375	115	32	107.6	61.8	29.8
51636	♀	"	870	488	382	122	35	109.6	61.5	29.0
Average	**6 ♀**		**848**	**492**	**358**	**113**	**34**	**105.6**	**60.7**	**28.9**
Minimum	"		790	450	305	105	32	103.0	59.1	28.3
Maximum	"		890	525	400	122	38	109.6	61.8	29.8

The adult specimens are very uniform in coloration; immature specimens (Pl. XXVIII, fig. 2) are usually darker than adults. The cranial differences present nothing noteworthy; in none is there a trace of p^1. In three very young skulls the milk dentition is still present. The orbital ring is complete in one skull and nearly closed in another; usually the posterior third is open. The soles of the hind feet are uniformly naked to the heel, not "sometimes with the posterior third hairy," as has been said to be the case in some specimens of *A. robustus* (Fig. 64B).

Thomas has listed[2] a single specimen from Poko (near Niapu), in the Christy collection, as *Mungos paludinosus* G. Cuvier, which should probably be referred to the present species, as no other species was met with west of Faradje by the American Museum Congo Expedition.

Atilax macrodon belongs unquestionably to the *Herpestes paludinosus* group, but it is much larger and darker than typical *paludinosus*.

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[1] Type.

[2] 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472.

Mungos paludinosus mordax Thomas, from near Lake Nyasa, based on a skull, is obviously much larger (condylobasal length of skull 115 mm., the average for *macrodon* being about 105 mm.). *Mungos paludinosus rubellus* Thomas and Wroughton, from Portuguese East Africa, and *M. p. rubescens* Hollister, from German and British East Africa, are both much smaller, and both are red forms. *Athylax robustus* Gray, from the "White Nile" region is also much larger than *macrodon*, the condyloincisive length, as given by Thomas,[1] being 114.8 mm. (4.55 inches = length from premaxillæ to most posterior point of occipital condyles), and apparently much different in coloration, although two quite distinct forms are evidently covered by the description, which says: "General colour either grizzled reddish brown and white, or dark

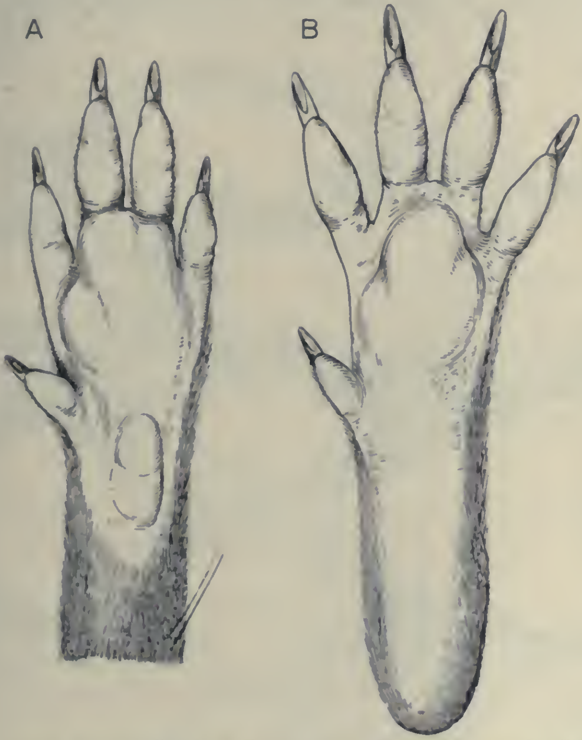

Fig. 64. *Atilax macrodon* (Type, No. 51629). A, palmar surface of left fore foot; B, plantar surface of left hind foot. Natural size.

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[1] 1882, Proc. Zoöl. Soc. London, p. 73.

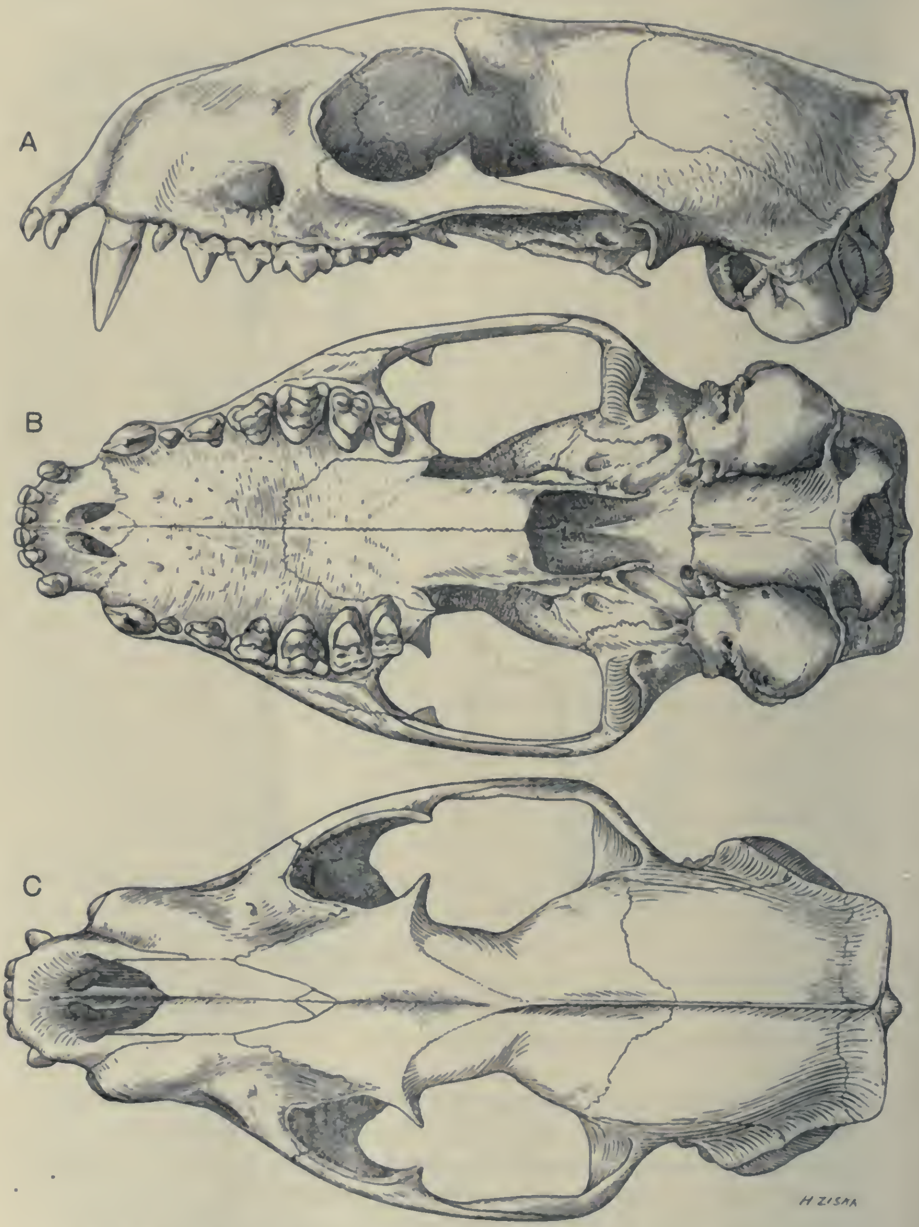

Fig. 65. *Bdeogale nigripes*. Skull of adult female (No. 51582). A, lateral view; B, palatal view; C, dorsal view. Natural size.

blackish brown without annulations." The first alternative seems to agree best with Gray's original description, and also with the specimens from Faradje referred above to *robustus*. That the Faradje specimens differ radically from the Niapu series seems beyond question, the Faradje specimens being nearly uniform reddish brown, including the tail, with all the long hairs broadly tipped with red, and broadly annulated with white about midway their length, while in *macrodon* the long hairs of the back and tail are usually entirely black (some of them minutely tipped with rufous in exceptional specimens), with the general effect of blackish instead of rufous.

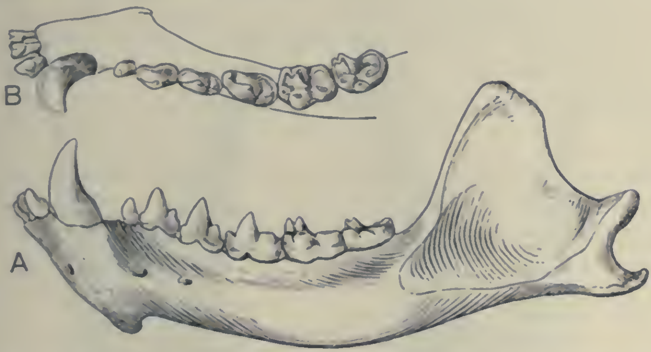

Fig. 66. *Bdeogale nigripes*. Adult female (No. 51582). A, lateral view of left mandible; B, crown view of left lower dentition. Natural size.

Bdeogale Peters

Bdeogale Peters, 1852, Monatsb. K. Preuss. Ak. Wiss. Berlin, p. 81; 1852, 'Reise nach Mossambique,' Zool. I, p. 119, Pls. xxvii-xxviii. Type, by subsequent designation (Thomas, 1882), *Bdeogale crassicauda* Peters.

Bdeogale nigripes Pucheran

Plates XXX, XXXI; and Text Figures 65–67

Bdeogale nigripes Pucheran, 1855, Rev. Mag. Zool., (2) VII, p. 111; 1858, Arch. Mus. Hist. Nat. Paris, X, pp. 120–124. Gaboon, West Africa.

Bdeogale nigripes Pousargues, 1897, Bull. Mus. Hist. Nat., III, pp. 202–205 (skull figured).

Bdeogale nigripes Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 472. Zambo, Belgian Congo (1 specimen).

Represented by 9 specimens, collected as follows:

Akenge, 2 (1 ♂ adult, 1 ♀ juvenile), September 30, October 8, 1913.

Niapu, 7 (1 ♂ adult, 1 ♂ juvenile, 3 ♀ adult, 2 ♀ subadult), November 20–26, December 12, 17, 1913.

These specimens show considerable variation in color regardless of age, and a much greater range due to age, as the adults and subadults when laid out in series might well be taken for different species. The younger specimens, except one, have acquired the permanent dentition, but the permanent canines are not fully up and the milk canines are still in place behind them; the skull sutures are still distinct. In other words, three of the four young specimens are "young adults," of nearly mature size. Just such specimens as these, as regards maturity, are often utilized as types of "new species" when older material is not available. They are, however, about one-eighth smaller than old adults, have uni-

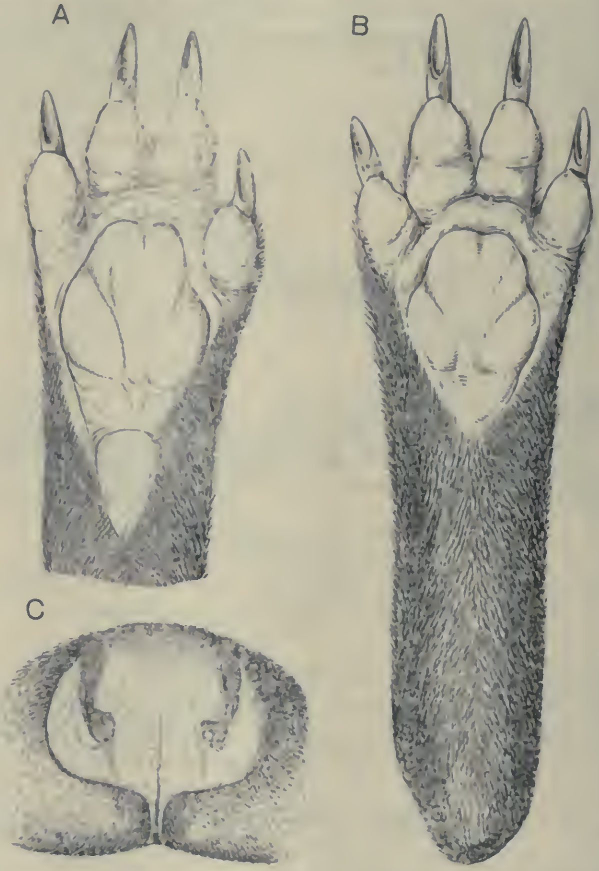

Fig. 67. *Bdeogale nigripes* (No. 51581). A, palmar surface of left fore foot; B, plantar surface of left hind foot; C, rhinarium. Natural size.

formly whiter tails, much lighter coloration both above and below, and much longer and softer pelage, the white tips of the overhair being much longer than in adults, yet the coat is not in the least suggestive of the soft woolly first pelage. The adults have in every instance a very short close-lying coat, only about half the length of the pelage of the subadult series. The dark areas below are also much paler and much more restricted in area in the young adults than in the older specimens (Pl. XXX).

The color variation in adults consists in a lighter or darker tone of the upperparts in different individuals, while below the darker ones are brownish black from the lower foreneck to the base of the tail, except for a large light pre-anal patch of lengthened yellowish hair; those with the upperparts lighter have the dark color of the lower surfaces restricted largely to the lower foreneck and pectoral region and more posteriorly to a narrow median band.

The subjoined table of measurements illustrates the variation in size and especially its relation to age, while the photographs reproduced in Plates XXX and XXXI indicate the difference in color and texture of the pelage.

Measurements of *Bdeogale nigripes*

			External Measurements					Skull		
Cat. No.	Sex and Age	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear	Condylo-basal Length	Zygomatic Breadth	Upper Cheek-teeth
51581	♂ ad.	Akenge	1015	630	385	112	35	112.3	62.0	35.5
51585	♂ "	Niapu	950	605	345	115	37	——	——	——
51582	♀ "	"	990	615	375	103	36	115.5	59.1	32.2
51583	♀ "	"	967	597	370	108	33	118.1	——	32.6
51586	♀ "	"	935	565	370	105	37	112.6	57.7	32.5
Average	**5 ad. (2♂, 3♀)**		**975**	**600**	**369**	**107**	**35.6**	**114.6**	**59.6**	**33.2**
Minimum			935	565	345	103	33	112.3	57.7	32.2
Maximum			1015	630	385	115	37	118.1	62.0	35.5
51580	♀ subad.	Akenge	820	480	340	105	32	103.7	50.0	30.1
51587	♀ "	Niapu	885	530	355	110	33	106.5	51.7	32.0
51706	♀ "	"	825	500	325	109	33	——	——	——
51584	♂ juv.	"	595	365	230	85	38	——	——	——

HYÆNIDÆ

Thirteen specimens of *Crocuta*, all collected at a single locality, are the only examples of this family obtained by The American Museum Congo Expedition.

CROCUTA Kaup

Crocuta KAUP, 1828, Oken's Isis, XXI, Heft 11, p. 1145. Type, by tautonymy and monotypy, *Hyæna crocuta* (Erxleben), the only species definitely mentioned.

Crocotta KAUP, 1829, Ent. Gesch. u. Natürl. Syst. Europ. Thierwelt, I, p. 74. An emendation of *Crocuta* Kaup, 1828.

Crocuta crocuta fortis, new subspecies

Plates XXXII–XXXIV; XXXV, Figures 1, 3; XXXVI, Figure 1

Type, No. 52068, ♀ adult, Faradje, northeastern Belgian Congo, February 5, 1913; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1222.

Coloration exceedingly variable and hence not diagnostic; size much larger than in any hitherto described form of *Crocuta*. Condylobasal length of skull (average of nine specimens) 250 mm., as against an average of 232 mm. in both *C. c. germinans* (twenty-six specimens from western British East Africa) and *C. c. fisi* (twelve specimens from eastern British East Africa); zygomatic breadth (average of same series) 181 mm., as against 162 and 163, respectively, for *germinans* and *fisi*. This difference appears to hold good for all other described forms of *C. crocuta*, so far as the few published cranial measurements indicate. All the other cranial measurements are proportionately greater, the minimum for *fortis* being often only a little less than the maximum for *germinans* and *fisi*. (For comparative average, minimum, and maximum cranial measurements of these three forms, see table on p. 219.) The few available external measurements of *fortis* taken from animals in the flesh are consistent with the cranial measurements, as shown by the following:

Comparative External Measurements of *Crocuta crocuta fortis, C. c. germinans*, and *C. c. fisi*

	Number of Specimens	Total Length	Head and Body	Tail Vertebræ	Hind Foot
C. c. fortis	2 ♀	1665	1340	325	257
C. c. germinans	12 ♂, 9 ♀	1501	1209	292	230
C. c. fisi	5 ♂, 2 ♀	1475	1191	284	230

Crocuta c. fortis is represented by thirteen specimens, all collected at Faradje, May 10, 1911 to February 5, 1913. There are six skins, taken as follows: two in February, two in August, and one each in September and December. The series includes five adult skins with skulls, one adult skin without skull, one complete skeleton, and six skulls without skins, of which three are immature.

The six adult skins vary greatly individually in color and markings. In two of them the ground color is grayish in general effect, in two others reddish, while the other two are intermediate between the grayish and reddish phases. No. 52062, a slightly immature male, is pale buffy white (decidedly gray in general effect in certain lights); the spots are large and deep black (Pl. XXXII, fig. 2). In No. 52061 (sex not indicated) the general tone is slightly more buffy than in 52062, and the spots are much smaller and more numerous, but also deep black. No. 52068 (the type of *fortis*, an adult female) is slightly buffy in general tone, and the spots on the body are small and brownish black; those on the shoulders and thighs are smaller, more sharply defined and deep black, in contrast with those of the sides and back. No. 52063 (sex not indicated) is ochraceous buff, the body spots of medium size and dull black, those of shoulders and thighs deep black. No. 52064 (adult female) is pale ferruginous in general tone; the body spots are large and black (Pl. XXXII, fig. 1). No. 52059 (adult male) has the ground color strongly reddish; the spots are brown, pale, and not sharply defined on the sides and shoulders, much darker on the thighs and lower back.

The individual color variations in this series of *fortis* agree closely with those of *germinans* from British East Africa as recorded by Roosevelt and Heller,[1] and later by Hollister.[2]

The table of measurements (p. 219) shows that nine adult skulls of *fortis* (the sex of four of them is not known) vary as much individually as do the twenty-six skulls of *germinans*, listed by Hollister (*loc. cit.*, pp. 146–149), from Sotik, Loita Plains, Guaso Ngishu Plateau, and the Mount Kenia region. They average, however, considerably larger in nearly all dimensions. They also differ from skulls of *germinans*, as represented by specimens from Kabalolot Hill (Sotik), Elmenteita, and Kijabe, with which they have been compared, in the shape and size of the auditory bullæ, which are relatively larger, much more swollen, and very different in the anterior portion, which is much more expanded and less tapering than in *germinans* (Pl. XXXV). The posterior border of the palatal floor (Pl. XXXIII) is much more deeply incised and more V-shaped than in *germinans*, in which the posterior border is less deeply and more evenly convex forward. This feature is somewhat variable in both series and thus would not always prove diagnostic. In six of the nine adult skulls of *fortis* the palatal border is deeply incised, in two moderately so, in the other shallow and evenly hollowed, as in *germinans*.

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[1] 1914, 'Life Histories of African Game Animals,' I, p. 261.
[2] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, pp. 143–144.

The difference in the size and shape of the auditory bullæ between the two forms is practically constant and strongly marked. Another difference is seen in the form of the braincase, and although slight appears to be of great constancy. In *fortis* the sides of the braincase slope uniformly in an even plane from the upper border of the sagittal crest nearly to the parieto-squamosal suture, while in *germinans* this surface of the braincase is distinctly convex (Pl. XXXVI, figs. 1 and 2).

The usual range of individual variation in other features of the skull is present and calls for no special comment. The manner of insertion of p^2 is, however, markedly variable. In six of the nine adult skulls of *fortis* the long axis of this tooth scarcely deviates from the axis of the toothrow (Pl. XXXIV, fig. 1); in two other skulls it is highly oblique (Pl. XXXIV, fig. 2); in the other skull on the left side it is oblique to the trend of the toothrow, while on the right side it is normal in position. This sporadic obliquity of p^2 is so common in carnivores as not to require particular mention except that it has sometimes been considered as having diagnostic value. Whether it has the importance ascribed to it by Hollister[1] in the case of *Hyæna hyæna bergeri* and *H. dubia* seems uncertain. In his two skulls of *dubia* p^2 stands straight with the axis of the toothrow, and in the eleven skulls of *bergeri* it has an oblique position. As this feature is the chief alleged difference between the skulls of the two forms, the examination of a larger series of skulls of *dubia* from this point of view seems desirable.

The accompanying table of comparative cranial measurements of *C. c. germinans*, *C. c. fisi*, and *C. c. fortis* is based, in the case of *germinans* and *fisi*, on Hollister's tables (*loc. cit.*, pp. 146–149), and, in the case of *fortis*, on the table here given (p. 219). The series of skulls of the three forms are strictly comparable in respect to age and sex. The twenty-six skulls of *germinans* include fourteen males and twelve females; of the twelve skulls of *fisi* eight are males and four are females; the nine of *fortis* are probably about equally divided as to sex, although the sex is not indicated for four of them. It is well known, however, that there is no appreciable sexual difference in size in the spotted hyenas.

Not many published measurements of skulls of the other described forms of *Crocuta* are available for comparison. Matschie, in his well-known paper on the hyenas,[2] has given the basilar length of most of the twenty-one skulls then in the Berlin Museum, but a considerable number of the specimens were immature. Reducing his "Basilarlänge" to condylobasal length,[1] ten of the eleven adult skulls give an average condylobasal length of 238 mm., and a zygomatic breadth of 164 mm. These results are within a few millimeters of the same measurements for twenty-six skulls of *germinans* from British East Africa as published by Hollister (*loc. cit.*). The range of variation in these ten skulls is more than covered by Hollister's series of *germinans*. The other (or eleventh) skull of the Matschie series is his type of *germinans* from Lake Rukwa, of which the basilar length is given as 236 mm., and the zygomatic breadth as 196 mm.; obviously the latter is a misprint, possibly for 169 mm. In this case the type skull of *germinans* would be larger than the average of the British East Africa series but within the range of normal individual variation.

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[1] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 140, 143, Pl. III.
[2] 1900, 'Geographische Formen der Hyaenen.' Sitzungsb. Ges. Naturf. Freunde Berlin, pp. 18–58.

Before the large series of spotted hyenas brought together by the Roosevelt and the Rainey African expeditions were assembled at the United States National Museum, it was customary to regard marked variations in color and markings in these animals as indicative of specific diversity. During the period from 1900 to 1914, fourteen forms of the genus *Crocuta* were described, thirteen of them being given the rank of species. Nine forms are East African, the other five are from Southwest and West Africa, based often on single specimens, sometimes immature examples. They were usually founded on features of coloration or on slight variations in cranial characters, now known to have no distinctive value. Some of them will doubtless prove to represent recognizable geographic phases, but in most cases their real status and distinctive characters are yet to be established. These alleged forms, with their type localities, follow.

The East African forms are:

1900. *Hyæna (Crocotta) germinans* Matschie. Lake Rukwa, German East Africa.
1905. *Hyæna (Crocuta) leontiewi* Satunin. "Abyssinia."
1908. *Crocotta kibonotensis* Lönnberg. Kibonoto steppe, Kilimanjaro.
1908. *Crocotta panganensis* Lönnberg. Kibonoto, Kilimanjaro.
1910. *Crocuta nyasæ* Cabrera. South Nyasaland.
1910. *Crocuta thomasi* Cabrera. Ankole, Uganda
1911. *Crocuta nzoyæ* Cabrera. Uasingishu, Nzoya River, British East Africa.
1911. *Crocuta rufopicta* Cabrera. Odweina, British Somali
1914. *Crocuta crocuta fisi* Heller. Merelle Waterholes, Marsabit Road, British East Africa.

The Southwest and West African species are:

1900. *Hyæna (Crocotta) gariepensis* Matschie. Gariep, Orange River district ("Bambusbergen im Oranje-Gebiet").

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[1] In Faradje specimens the condylobasal length is 12 to 15 mm. greater than the basilar length as defined by Matschie.

1900. *Hyæna (Crocotta) wissmanni* Matschie. Epukiro.
1900. *Hyæna (Crocotta) noltei* Matschie. Yoko, Cameroon.
1900. *Hyæna (Crocotta) thierryi* Matschie. Sansanne Mangu, North Togo.
1900. *Hyæna (Crocotta) togoensis* Matschie. Kratyi, Togo.

Hollister has already called attention to this unsatisfactory condition of affairs in the *Crocuta* group in no uncertain terms, as follows:

> Numerous forms of the spotted hyena from many parts of Africa have been named by various authors. Most of these species have been based on color differences observed in very small series, or even between single examples of two supposed races. Great stress has been laid on the wide difference between gray, buff, and red examples, and on the color of the spots—black, brown, or red. Minor differences in the skulls have also been represented to be of specific importance. The splendid series of *carefully sexed* skins and skulls of these animals assembled in the United States National Museum by the Smithsonian and the Rainey expeditions has made possible a careful study of individual variation in a large number of specimens from the same region, and a comparison of suitable series from different localities. The results quite discredit many characters which have been considered as of primary importance in distinguishing species. Within a single series of specimens from the Sotik region, for example, are extremes of red and gray types, brown and black spotted types, spotted and unspotted shouldered examples, and remarkable variations in shape and size of the skull. Of more importance, however, are the numerous examples, showing every degree of variation between extremes in all these characteristics.

Hollister has found reason to discredit Cabrera's *Crocuta nzoyæ*, based on a single specimen, a series of topotypes having become available for comparison with series collected in the Southern Guaso Nyiro and Sotik, both series containing "specimens bridging in every particular all variations in color and markings between red and gray types, between blackish and light brown spotted types, and between any extremes in shape and size of skull and teeth." Lönnberg's *Crocotta kibonotensis* and *Crocotta panganensis* (both from slightly separated localities in the Kilimanjaro district) are discredited, as is also Cabrera's *Crocuta thomasi* from Ankole.

While the kind of work here under stricture should not be too severely condemned, in consideration of the fact that a decade or two ago no large series of specimens from single localities of any of the larger mammals of Africa were available for study, and that there was consequently no way of ascertaining the amount and character of the purely individual variation to be expected and allowed for, it is certainly to be hoped that broader views will prevail in the immediate future, so much material from single localities is now available for careful examination. The large series of specimens of many forms of Carnivora, and also of other orders of mammals, collected at single localities by the American Museum Congo Expedition, throw much light on the subject of

Measurements of Nine Skulls of *Crocuta crocuta fortis*, from Faradje, Belgian Congo

Cat. No	Sex	Greatest Length	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Interorbital Breadth	Postorbital Constriction	Breadth at Base Canines	Greatest Length Nasals	Upper Toothrow c-m	Lower Toothrow c-m	Upper Carnassial	Condition of Basal Suture
52059	♂	292	258	183	106	58.0	47.5	63.4	66.0	102.8	111.4	35.5×19.4	Closed
52068[1]	♀	291	252	191	108	58.5	46.0	65.7	63.4	101.8	110.8	38.0×21.5	"
52063	—	286	253	179	105	58.7	45.4	67.6	66.6	102.5	110.9	38.2×19.7	"
52065	—	288	257	184	108	58.6	51.2	65.0	——	101.8	111.2	37.6×21.0	"
52066	—	284	249	182	105	59.0	43.0	63.5	54.2	103.0	111.0	35.0×19.1	"
52064	♀	280	252	177	102	58.7	49.0	63.8	56.6	105.4	112.0	38.1×21.0	"
52069	—	278	245	180	102	58.0	48.5	63.9	67.7	95.0	108.0	35.5×19.3	"
52097	♀	275	242	178	100	54.8	48.3	60.0	58.0	100.6	109.4	37.4×22.5	"
52060	♂	270	242	174	102	55.0	44.0	61.0	61.0	99.5	105.4	35.9×18.9	Open
Average		**283**	**250**	**181**	**104**	**57.7**	**47.0**	**63.8**	**61.7**	**101.4**	**110.0**	**36.8×20.3**	

Comparative Measurements of Skulls of *Crocuta crocuta germinans*,[2] *C. c. fisi*[2] and *C. c. fortis*

Subspecies	No. of Skulls		Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Interorbital Breadth	Postorbital Constriction	Breadth at Canines	Length Nasals	Upper Toothrow	Lower Toothrow	Upper Carnassial
C. c. germinans	26	**Average**	**232**	**162**	**94**	**53**	**42.5**	**59**	**57**	**97**	**105**	**35.0×20.2**
" " "		Minimum	221	147	90	48	37	54	47	94	101	32.7×17.9
" " "		Maximum	254	174	100	60	49	65	67	106	113	37.6×21.7
C. c. fisi	12	**Average**	**232**	**163**	**97**	**55**	**46**	**59**	**56**	**97**	**104**	**34.9×19.0**
" " "		Minimum	225	156	91	50	40	56	50	94	101	32.0×17.9
" " "		Maximum	242	175	99	60	48	61	67	101	109	37.1×21.3
C. c. fortis	9	**Average**	**250**	**181**	**104**	**58**	**47**	**64**	**62**	**101**	**110**	**36.8×20.3**
" " "		Minimum	242	174	100	55	43	60	54	95	105	35.0×18.9
" " "		Maximum	258	191	108	59	51	67	67	105	112	38.2×22.5

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[1] Type.

[2] Based on Hollister's published measurements (1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 146–149.)

individual variation, and the comment thereon in the present series of papers on Congo mammals in relation to its bearing upon the conceptions of "species" held in earlier days, should not be considered as unkind or personal criticism of authors who had no other method of making known their discoveries and of thus contributing, in a way, important faunistic and morphological information.

FELIDÆ

The cats obtained by The American Museum Congo Expedition are represented by one hundred and twenty specimens, referable to the genera *Leo*, *Panthera*, *Leptailurus*, *Profelis*, and *Felis;* the cheetahs (*Acinonyx*) and caracals (*Caracal*) are unrepresented. They were mainly collected at or near Faradje in the veldt region of northeastern Belgian Congo. In several instances single forms are represented by fairly large series from the same locality, as in the case of the lions, leopards and servals. Thus considerable material is for the first time available for the study of individual differentiation in African Felidæ. While the collections from British East Africa in the United States National Museum at Washington include large series that are properly referable to the same regional form they usually represent a number of localities. Hollister's report[1] on this rich material contains numerous tables of detailed measurements, particularly of skulls and dentition, that have proved of great assistance in connection with this study of the cats of the Congo Collection. The accompanying large series of photographic illustrations of individual color variation, particularly in the leopards and servals, it is hoped will prove of interest to specialists of these groups.

Leo Oken

Leo Oken, 1816, 'Lehrb. Naturg.,' Th. 3, Abth. 2, p. 1070. Type, by tautonymy, *Felis leo* Linnæus.

The name *Leo* has been employed generically by various authors during the last half century, independently of each other and probably in ignorance of Oken's earlier use of the name, for the lion group exclusively, notably by J. E. Gray in 1867 and 1869.

The well-marked differences, both external and cranial, that characterize the lion group in contradistinction to all other cats are too well known to require recapitulation. These differences are strongly marked in comparison with the leopard group, with which some authors associate the lions under the generic designation *Panthera*, while others still adhere to the old method of grouping all cats under *Felis*, with the domestic cat as genotype; others exclude from *Felis* only the cheetahs and lynxes. This diversity of action is explainable only on the principle of personal equation in judging how much differentiation is required as basis of a generic group.

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[1] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, pp. 150–180, Pls. xli–lv.

Type Locality of *Felis leo* Linnæus

No definite type locality appears to have been assigned for *Felis leo* Linnæus, the "habitat" of which was given by the author as "Africa," the lions of Asia being thus not involved in the determination of a type region. Thomas, in 1911, in his paper on 'The Mammals of the Tenth Edition of Linnæus; an Attempt to fix the Types of the Genera and the exact Bases and Localities of the Species,'[1] says justly (p. 135): "No type locality available" (that is, on the basis of the original description). A type locality therefore must be determined on other grounds from consideration of the dozen more or less currently recognized African forms of the original *Felis leo*. Of first importance in such consideration is the geographical area from which the lions known to pre-Linnean writers would most naturally have come. This was evidently the Mediterranean coast region of Africa, from the time of Pliny to Linnæus, and even much later it was the main source of supply of lions for the menageries of Europe, especially of France.[2]

Fortunately a definite locality is given for the specimens on which the description and drawings of F. Cuvier's Lion de Barbarie were based.[3] Their geographical origin is thus stated: "Ce Lion[4] fut pris dans un piége, entre Constantine et Bonne, en 1795, âgé d'un an environ, avec une femelle de la même portée; et le bey de la première de ces villes fit présent de ces deux animaux au gouvernement français d'alors." From Lacépède we further learn: "C'est dans un bois voisin de Constantine, près de la côte septentrionale d'Afrique, que commença la captivité de ces deux Lions. Un an après, le citoyen Félix Cassal, l'un des gardiens de la ménagerie du Muséum, qui à cette époque voyageait en Barbarie, par ordre du gouvernement, pour y acheter des animaux rares et intéressants, parvint à les acquérir pour le Muséum, et avant peu de mois il les conduisit à Paris."[5]

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[1] Proc. Zoöl. Soc. London, I, March, pp. 120-158.

[2] Cf. Cuvier and Geoffroy. 1819, 'Hist. Nat. Mamm.,' I, livr. 9, Août, p. 2 (at bottom).

[3] 1819, 'Hist. Nat. Mamm.,' I, livr. 11, Octobre, p. 1.

[4] The male, so well delineated by Maréchal. Maréchal's drawing was first published (uncolored) by Lacépède and G. Cuvier in the work entitled 'La Ménagerie du Muséum national d'histoire naturelle' (La Lionne, p. 5) in 1801 and republished by F. Cuvier (*loc. cit.*) in 1819. The other specimens figured and described are also from the same source.

[5] Lacépède, 1801, 'La Ménagerie du Muséum national d'histoire naturelle,' (La Lionne), p. 5.

Fitzinger in 1868, in the first part of his revision of the Felidæ,[1] restricted *Felis leo* Linnæus to the Barbary lion (his *Leo barbarus*), the only citation of *Felis leo* Linnæus being placed (*loc. cit.*, pp. 432–436) under this subspecies (*Felis leo barbarus*). The other citations given by him under this race appear to be pertinent. The reference of primary importance is to F. Cuvier and Geoffroy's Lion de Barbarie, figured and described, as shown above, from specimens captured near Constantine on the coast of Algeria. This regional form of the African lion had become in 1829 the sole basis of J. B. Fischer's *Felis leo*, *a barbarus*,[2] and has since been recognized as a race or variety of *Felis leo* Linnæus by various authors.[3] It seems clear that it may be properly considered as the type form of *Felis leo* and stand as *Leo leo leo* (Linnæus). On this basis I designate as type locality for the Linnean *Felis leo* the Barbary coast region of Africa, or, more explicitly, Constantine, Algeria.

African Forms of Lions

It is generally agreed by taxonomers that the lions of Asia and Africa are merely geographic forms of a single specific type. This is an obvious result of the absence of any marked physical barrier separating northeastern Africa from southwestern Asia.

About a dozen specific or subspecific names have been proposed for the lions of Africa. Several of these are merely replacement names for *leo* of Linnæus, bestowed without nomenclatural reason, as *africanus* Jardine (1834), *gambianus* Gray (nom. nud., 1843), *nobilis* Gray (1867), and do not require further consideration. The following additional names were given to supposed subspecies. They are here listed in chronological sequence, with indication of their respective type localities and bases. Most of them will doubtless prove available for regional forms but several of the East African designations will probably be found to be superfluous.

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[1] Fitzinger, L. J., 1868, 'Revision der zur natürlichen Familie der Katzen (Feles) gehörigen Formen.' Sitzungsb. Ak. Wiss. Wien, LVIII, Abth. 1, pp. 421–519.

[2] 1829, 'Synop. Mamm.,' p. 197.

[3] Hollister, in 1910 (Proc. Biol. Soc. Washington, XXIII, September 2, p. 123) called attention to three names given by J. N. von Meyer to "races" of lions in a thesis for the degree of doctor of medicine at the University of Vienna in 1826. The title-page of Meyer's work is in Latin, the text in German. The title (in part) is: 'Dissertatio/inauguralis anatomico-medica/de/Genere Felium/ . . . [= 11 lines] Joannes Nep. nobilis de Meyer. . . .' 'The date of presentation is August 5, 1826. The author's dedication to his father occupies three unpaged leaves, dated "Wien am 12. July 1826." This is followed by the text of the thesis (pp. 1–62, with one plate and an explanatory text page). A "Naturhistorischer Theil" occupies pages 1 to 19, followed by the "Anatomischer Theil," pages 20–62. Under the subheading "Löwen (Felis Leo)" we find on page 6 the following:

"Nach der Verschiedenheit der Mähne und der Farbe setzte man drey Racen fest:

(1) Die Barbarische (barbaricus), bey welcher sich die Mähne längs der Mitte des Bauches bis an Hinterfüsse hinzieht.

(2) die Persische (persicus), welcher diese verlängerte Mähne fehlt; und

(3) die Senegalische (senegalensis), welche sich von der Persischen nur durch eine höhere Farbe und die gleichfarbige Halsmähne unterscheidet."

There is no further reference to these races in this brochure.

As stated by Hollister, the names of these races "have heretofore dated from Fischer's 'Synopsis Mammalium,' 1829," except that Fischer used *barbarus* instead of *barbaricus* for the Barbary lion. Although Fischer's names have a much better basis than Meyer's, they are three years later than Meyer's. Fischer's diagnoses are short, but they are diagnostic, while Meyer's are not, and have further a solid basis through citations of F. Cuvier's Lion de Barbarie for *barbarus* and the same author's Lion du Sénégal for *senegalensis*, and of Temminck for *persicus*.

1758. **Leo leo leo** (Linnæus). *Felis leo* Linnæus, 'Syst. Nat.,' 10th Ed., I, p. 41. "Africa." Type locality, by subsequent designation (*supra*, p. 222), Constantine, Algeria.

1826. *Felis leo*, race 1, *barbaricus* Meyer, 'Dissert. anatom.-med. de Genere Felium,' p. 6. Without definite type locality. (*Supra*, p. 222, footnote No. 3.)

1829. *Felis leo*, α. *barbarus* Fischer, 'Synop. Mamm.,' p. 197. Based on F. Cuvier's Lion de Barbarie from Constantine, Algeria. Hence = *Felis leo* (*s.s.*).

1826. **Leo leo senegalensis** (Meyer). *Felis leo*, race 3, *senegalensis* Meyer, 'Dissert. anatom.-med. de Genere Felium,' p. 6. The only indication of the type region is the name *senegalensis*.

1829. *Felis leo*, β. *senegalensis* Fischer, 'Synop. Mamm.,' p. 197. Based on F. Cuvier's Lion du Sénégal, without definite type locality. The name *Felis leo senegalensis* preoccupies *Felis senegalensis* Lesson, 1839, for a servaline cat.

1830. *Felis leo*, ε. *capensis* Fischer, 'Synop. Mamm.,' addenda, p. 565. Based on *Felis leo*, var. b, the "South African Lion" of Griffith's 'Anim. Kingd.,' V, 1827, p. 163; *idem*, II, Pl. facing p. 428. The name *Felis leo capensis* is preoccupied by *Felis capensis* Forster, 1781, for the South African serval

1858. **Leo leo melanochaitus** Ham. Smith. *Leo melanochaitus* Ham. Smith, 'Introd. to Mamm.,' in Jardine's 'Naturalists' Library,' XV, 2d Ed., p. 177, Pl. x. "The Black Maned Lion of the Cape . . . . figured in Griffith's Vertebrated Animals . . . . Habitat the Cape." The plate is a republication in color of the plate in Vol. II of Griffith's 'Anim. Kingd.' Hence *Leo melanochaitus* Smith has the same basis as *Felis leo capensis* of Fischer, 1830, as cited above, and will thus be the proper designation of the Cape race of the lion. (Cf. Hollister, 1910, Proc. Biol. Soc. Washington, XXIII, September 2, p. 123.)

1891. **Leo leo somaliensis** (Noack). *Felis leo* var. *somaliensis* Noack, Jahrb. Hamburg. Wiss. Anst., IX. Hälft 1, p. 120. "Somaliland." No definite type locality indicated. Described from young animals in the Berlin Zoölogical Gardens. Its status as a regional form is not as yet satisfactorily established.

1900. **Leo leo massaicus** (Neumann). *Felis leo massaicus* Neumann, Zool. Jahrb., Syst., XIII, October, p. 550. Type locality, Kibaya, Massai Land, German East Africa.

1900. **Leo leo kamptzi** (Matschie). *Felis leo kamptzi* Matschie, Sitzungsb. Ges. Naturf. Freunde Berlin, p. 92. Type locality, Yoko, Sanaga, Cameroon.

1908. *Felis leo sabakiensis* Lönnberg, in Sjöstedt's 'Wiss. Ergebn. Schwed. Zool. Exped. Kilimandjaro-Meru, 1905–1906,' p. 22. Type locality, Kibonoto, Kilimanjaro. Type an adult female. Considered by Hollister (1918, U. S. Nat. Mus. Bull. 99, pt. 1, p. 156) as not separable from *Felis leo massaicus* Neumann.

1913. *Felis leo roosevelti* Heller, Smithsonian Misc. Coll., LXI, No. 19, November 8, p. 2. Type locality, as given by Heller, "highlands of Abyssinia near Addis Ababa." Addis Ababa is discredited by Hollister (*loc. cit.*, 1918, p. 165) as the true type locality, and he considered the status of subspecies *roosevelti* as "greatly in doubt." The type, a captive specimen, was "presented by King Menelik of Abyssinia to President Roosevelt in 1904," and in March of that year was deposited in the National Zoölogical Park in Washington, where it died November 14, 1906. Hollister further states that "there is every chance that the lion was brought to the Emperor as a kitten by some of his subjects living in some far-distant corner of Abyssinia. . . . All the characters used in separating the race. . . . are those common to specimens of *massaica* reared in captivity, and it might be argued that since the type specimen of *roosevelti* might well have originally been captured within the habitat of *massaica* the name should be placed in the synonymy of the latter form." He appears, however, not to have been then ready to make this assignment, as he gives *roosevelti* provisional recognition.

1913. **Leo leo nyanzæ** (Heller). *Felis leo nyanzæ* Heller, Smithsonian Misc. Coll., LXI, No. 19, November 8, p. 4. Type locality, Kampala, north shore of Lake Victoria Nyanza, Uganda. Type, a flat skin, without skull.

1913. **Leo leo bleyenberghi** (Lönnberg). *Felis leo bleyenberghi* Lönnberg, Rev. Zool. Africaine, III, fasc. 2, December, p. 273. Type locality, Katanga, Belgian Congo.

Leo leo azandicus, new subspecies

Plates XXXVII to XL

Type, No. 52084, ♂ adult, Vankerckhovenville, northeastern Belgian Congo, April 18, 1912; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1061.

Slightly larger in cranial and dental measurements than either *L. l. nyanzæ* or *L. l. massaicus*, to which it is closely related, especially to *nyanzæ*. General coloration much as in *nyanzæ* but much paler, the general tone above varying from pale buff to cream-buff instead of "ochraceous tawny," and underparts correspondingly paler; it is strikingly different from the general grayish tone of typical *massaicus*.

Type.—Pelage very short, only about 8–10 mm. in length on most of the upperparts, or about as in typical *massaicus* from near Lake Nyanza. General coloration above "warm buff" (Ridgway, 1912), darkening on sides of head and neck to "cinnamon buff," and over the mid-dorsal area, from the shoulders posteriorly, to "clay color," paler on the flanks; underparts "light buff," whitish medially; fore limbs externally pale orange-yellow, much paler internally; hind limbs (including thighs) externally grayish, with a slight buffy tone, gradually passing into "pale buff" internally; tail proximally grayish slightly suffused with pale buff, the hairs minutely tipped with blackish, the black tips increasing in length on the middle third of the tail, passing thence gradually into a long terminal brownish-black tuft; soles brownish black, the long dark hairs extending upward between the toes and encircling the claws, proximal to which is a narrow band of pale buffy white; dark ear spot of lengthened hair intense black. The mane is well developed, forming a narrow median crest (longest hairs 120 to 150 mm. in length) extending from between the ears posteriorly to the shoulders, spreading laterally to the sides of the head and neck to the foreneck, chest, and sides of shoulders (longest hairs on shoulders 150 to 200 mm. in length). The hairs of the median crest are pale buff grizzled with blackish, the latter prevailing; on sides of neck and foreneck entirely warm buff; lower foreneck, chest and shoulders darkened with a profusion of blackish-tipped hairs. There is no ventral crest. The type has a better developed mane (Pl. XXXVII) than any of the five other male skins, in two of which it is reduced nearly to obsolescence.

Two of these five adult males agree very closely in coloration with the type; and two others are paler, one of them very much paler. Four of the five adult females are indistinguishable in color features from the male type, although the mid-region of the back is slightly darker than in males through slightly greater length of the blackish tips of the hairs. The other female is much paler than average males. Two of the three young specimens are darker than the adults.

The smallest of three young specimens, a nursling in the first soft coat (total length 650 mm., the teeth still enclosed in the gum), has the pelage long and more or less woolly, with sparse long fine overhair. This specimen is much paler than the other two, which are considerably older. The coloration is much paler than in adults, the upperparts being pale buff with a slight intermixture of long blackish hairs. The underparts are pale buffy white, strongest on the foreneck, palest posteriorly. The crown, from between the eyes to the nape, is blotched with small dusky brown spots; there is a median dorsal line, from the shoulders to the tail, formed of small disconnected blackish spots; the fore limbs are externally thickly marked with small spots of dull brown; the hind limbs are more heavily marked with still darker spots; the lower back and proximal half of the tail are also obscurely spotted with pale brown.

Another young specimen (No. 52071, milk dentition fully developed and four of the upper incisors and p^4 already replaced by permanent teeth) is much larger and several months older. In this the pelage is long and full; the upperparts are in general ochraceous buff, with many of the hairs conspicuously tipped with black, especially along the median line, and hence darker and more highly colored than any of the adults. The hairs of the dorsal area are about 80 to 90 mm. in length, with a narrow median crest in which the hairs have a length of 120 to 125 mm. The spotting on the head and limbs is similar to that of the nursling.

The third young specimen (without skull) is intermediate in age and size between the two above described, and is likewise intermediate in features of coloration. The pelage is longer and softer, with much more woolly underfur, the pelage of the upperparts averaging 225 to 250 mm. in length.

The two older of these three immature specimens are much more richly colored than any of the adults, and darker in general effect in consequence of the greater length of the black tipping of the hair.

The spotting of the limbs, crown and flanks, so conspicuous in the young, is scarcely distinguishable in adult males and usually reduced almost to obsolescence in adult females, varying more or less individually in both sexes.

Collectors' measurements of type: Total length, 2860 mm.; head and body, 1830; tail vertebræ, 1030; hind foot, 400.

Skull measurements of the type (Pls. XXXIX–XL): Greatest length, 375; condylobasal length, 335; zygomatic breadth, 245; interorbital breadth, 77.5; breadth at base of canines, 99; breadth at p^4, 133.4; length of nasals (middle), 93.8; length of lower jaw, 243; length of upper toothrow (including canine), 115.5; length of lower toothrow (including canine), 135.4; upper carnassial, 40.5×20.1; upper molar, 11.1×6.2. (For measurements see Tables D and I, pp. 237, 242.)

Represented by 15 specimens, all adult but 3, 14 of them from Faradje, collected as follows:

Faradje, 14 (1 skin without skull and 1 skull without skin, 7 specimens with flesh measurements), February 11, 1911–December 27, 1913.

Vankerckhovenville, 1 (skin, skull, and flesh measurements), April 18, 1912.

Each month of the year is represented by one or more specimens except March and October.

As shown by the subjoined tables of the available external measurements of Congo and East African wild-killed lions (Tables A, B, C, pp. 235-236) the Congo series is not distinguishable by size from *Leo leo nyanzæ*, nor is the latter separable on this basis from *L. l. massaicus*. The series are too small to be fully satisfactory, but as they consist of specimens strictly comparable as to age, and were all measured in the flesh by trained collectors, they are assumed to be reasonably indicative.

Comparison of Cranial and Dental Characters of Congo and East African Lions

Cranial.—The cranial measurements of these specimens (Tables D, E, F, G, the latter a comparative summary of D, E, and F), comprising a larger number of individuals than are available for external measurements, especially of females,[1] are based exclusively on skulls of old adults, in which the sphenoidal sutures are wholly obliterated, thus eliminating the element of immaturity. While the data thus obtained are not distinctively diagnostic they possess especial interest from the viewpoint of individuality. Unfortunately the series are, respectively, too limited for establishing a norm for the three regional forms involved as regards males, but this may be assumed as closely approximated in the case of the females, particularly of *nyanzæ* and *massaicus*.

The principal cranial measurements (see comparative summary, Table G, p. 240) of seven old male skulls of *azandicus* indicate that the greatest average length of the skull is 6 mm. more than in four comparable skulls of *nyanzæ* and 11 mm. more than in nine comparable skulls of *massaicus*. The breadth of the skull is correspondingly greater in *azandicus*, the zygomatic breadth being 7 mm. more than in *nyanzæ* and 8 mm. more than in *massaicus*; the mastoid breadth is 3 mm. more than in *nyanzæ* and 4 mm. more than in *massaicus*. In five old female skulls of *azandicus* the greatest length of the skull averages 1 mm. more than in ten comparable female skulls of *nyanzæ* and 2 mm. more than in thirteen comparable skulls of *massaicus*. While these differences are small and of little diagnostic value, the extremes (maxima and minima) are consistently in agreement with the averages. It is also to be noted that one of the male skulls, and one of the female skulls of *azandicus* are so far below the normal in size as to be properly considered as dwarfs, particularly the small female, and thus tend to reduce the average as given above for this form.

The relative proportion of zygomatic breadth to greatest length of skull in the males of the three forms differs only by a little less than one per cent, and in the females the divergence is about as slight. In *azandicus* (7 males, 5 females) the percentage of zygomatic breadth to greatest length is in males 67.2, in females 67.7; in *nyanzæ* (4 males, 10 females), for males 66.4, for females 66.2; in *massaicus* (9 males, 13 females), respectively 67.0 and 66.1. These statistics indicate a relatively wider skull for *azandicus*, the difference between females of *azandicus* and *nyanzæ*, its nearest geographical ally, being about 1.5 per cent and between *azandicus* and *massaicus* about 1.6 per cent. The breadth at the interorbital constriction is also slightly greater in *azandicus* than in either *nyanzæ* or *massaicus*.

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[1] In this tabulation the measurements given by Hollister (1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 166–169) have been utilized, but only the skulls indicated in his tables as having the "basal suture obliterated" have been admitted, in order that the measurements may be strictly comparable in age with the Congo series of twelve skulls, all of which are old adults with the sphenoidal sutures entirely obliterated by ankylosis. Hollister's skulls of *massaicus* include four of individuals reared in captivity. These are included in my tables (Table F, *b*, p. 239) but are excluded from the averages and extremes because they are so obviously abnormal. For special comment on these skulls see p. 234.

DENTAL.—The teeth (Tables I–L, pp. 242–246), like the principal measurements of the skull, present no differences by which specimens of *azandicus* can be distinguished with certainty from those of *nyanzæ* or *massaicus*. On the whole the dentition of *azandicus* is slightly heavier than in either of the others, but not more so than would be expected from the slightly greater size of the skull. The toothrows of both jaws, however, are disproportionately longer in *azandicus*, and the upper canine is a little heavier, in both males and females.[1] As in cranial measurements, *massaicus* is also the smallest of the three forms in most of the dental measurements.

Comparison of *Leo leo azandicus* with Uganda and British East Africa Lions

Leo leo azandicus is nearest geographically to *Felis leo nyanzæ* Heller,[2] at present an imperfectly known form. The latter was based on two specimens, the type, a flat skin of an adult male (without skull) from Kampala, Uganda, and a paratype (skin and skull) from Mulema, Uganda. Three other specimens are mentioned later by Heller[3] as examined by him in the British Museum, namely, "two lionesses from Mulema and one lioness from Ankole." The male from Mulema is stated by Heller to be "quite identical with the type in color and may be taken as representing the race [*nyanzæ*] here described." The cranial characters are based on this Mulema specimen. The range of the race is given as "Uganda and the Nile Valley from the German border northward to the Sobat and the Bahr-el-Ghazal drainages, east as far as Mount Elgon and the western shore of the Victoria Nyanza, and west to the Congo-Nile watershed; limits of range unknown" (Roosevelt and Heller, *loc. cit.*, p. 226). On the accompanying distribution map of the East African races of lions (*loc. cit.*, p. 227) the range of the Uganda lion is depicted in accordance with this statement, obviously in large degree hypothetical.

Hollister, in his 'East African Mammals in the United States National Museum' (1918, U. S. Nat. Mus. Bull. 99, part 1, August 16, pp. 156 and 164), greatly extended its range to the eastward, he referring to it part of the range of *massaicus* as defined by Roosevelt and Heller. Hollister says (*loc. cit.*, p. 156): ". . . . the excellent series of specimens now preserved in the United States National Museum proves that the lions of the Southern Guaso Nyiro and Sotik are separable from the Nairobi, Kapiti Plains, and Kilimanjaro animals, and are better placed with the form described by Heller from the northern shore of Victoria Nyanza, *Felis leo nyanzæ*." While agreeing with Hollister that these specimens are separable from *massaicus*, I would not assign them to the *nyanzæ* form, for reasons presently to be given.

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[1] If the dwarfish female (No. 52073) is excluded in computing the average.
[2] 1913, Smithsonian Misc. Coll., LXI, No. 19, November 8, pp. 4–5.
[3] 1914, Roosevelt and Heller, 'Life Histories of African Game Animals,' I, p. 228.

Through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals at the United States National Museum, the type specimen of *nyanzæ* and eleven of the specimens from British East Africa referred by Hollister to *nyanzæ*, and listed under this form in his tables of measurements (namely, four males from Lime Springs, Sotik; three females from Loita Plains; four females from South Guaso Nyiro River) have been sent to me for examination. From these specimens it appears probable that Hollister's conception of *nyanzæ* was based not so much on the type specimen of this form as upon the Sotik, Loita Plains, and Southern Nyiro specimens. This is especially indicated by his reference to the pelage, as he says: "The Uganda lion. . . .is a darker, richer colored, and longer-haired animal than the lion of the Kapiti Plains and Kilimanjaro regions" (*loc. cit.*, p. 164). The type specimen of *nyanzæ* is short-haired, like the *azandicus* series and typical *massaicus* from the Kapiti Plains and the Kilimanjaro district, while the Sotik, Loita Plains, and Southern Guaso Nyiro River specimens are long-haired, the pelage being not only twice the length of that of *massaicus* but much heavier in consequence of its greater length. It therefore seems desirable to recognize the Sotik, Loita Plains, and Southern Guaso Nyiro lions as a well-marked race intermediate between the East African *massaicus* and the Uganda *nyanzæ*, characterized by the differences of pelage and coloration pointed out by Hollister as separating his "*nyanzæ*" from typical *massaicus*. This race, in view of Hollister's important researches on the mammals of East Africa, may be fittingly named as follows.

Leo leo hollisteri, new subspecies

Felis leo nyanzæ Hollister, 1918, U. S. Nat. Mus. Bull. 99, part 1 August 16, pp. 163–164, 166–169 (part; not *Felis leo nyanzæ* Heller).

Type, U. S. Nat. Mus. No. 181568, ♂ adult (skin and skull), Lime Springs, Sotik, British East Africa, April 18, 1911; E. Heller, Rainey African Expedition. Orig. No. 2051.

General coloration above paler, and pelage much longer and thicker, than in either *nyanza* or *massaicus*; more buffy and less gray than in *massaicus*. Ventral surface and inside of limbs much lighter or more whitish (pale creamy white) than in either *massaicus*, *nyanzæ*, or *azandicus*.

Range, as now known, the eastern drainage of Victoria Nyanza.

As Hollister has stated (*loc. cit.*, p. 156), there are "no reliable characters by which the skulls of the two races [*massaicus* and *nyanzæ*] may be distinguished." While there is a slight average difference in size it is not diagnostic, the large amount of purely individual variation exceeding the average differences, not only in size but in details of structure.

Hollister believed (*loc. cit.*, p. 164) that the type skin of *nyanzæ* had been "considerably darkened by stain, apparently from red soil and also from some native tanning process. This [he says] has reddened all the lighter parts on the face, head, and limbs." On a first hasty inspection of the skin I accepted Hollister's view that the reddened areas were the result of staining, but a later, more careful, examination convinced me that this assumption is not warranted, although it appears to have influenced him in referring the Sotik and other British East Africa specimens to *nyanzæ*. The redder markings on the limbs are perfectly symmetrical in form, size and position, while there is no suggestion of similar reddening on the lighter colored ventral edges of the skin, or elsewhere on the body or on the head, as there most likely would be were these ruddy areas of accidental or artificial production. Both hind feet present exactly the same pattern of interdigital narrow streaks of intensified color extending for several inches proximally from the junction of the toes, while the thickened and slightly lengthened reddish hair on the "heel," divided mesially in skinning, fit together to form an elongated symmetrical brownish patch on the posterior aspect of the tarsus, a differentiation of color and texture common in the Felidæ. Incipient interdigital streaks of deepened color on the hind feet are often present in other forms of lions, but usually less developed than in the type skin of *nyanzæ*. The anterior surface of the forefeet is considerably darkened in comparison with the feet of the allied races (*massaicus*, *hollisteri*, *azandicus*), not by staining or discoloration but as a normal condition. The same is true also of the "darkened" areas of the face and head.

The four geographic races of lions it is here sought to establish undoubtedly completely intergrade geographically. The extremes are *Leo leo azandicus* of the savannah district of northeastern Belgian Congo and *L. l. massaicus* of British and German East Africa, east of the Victoria Nyanza drainage system. They are not only widely separated geographically and environmentally, but differ appreciably in size and so strikingly in coloration that if one had to deal with them separately, or without the connecting intermediates, it might seem reasonable to consider them as specifically separable.

L. l. nyanzæ is at present imperfectly known as to its average characters and range. Its relatively intense coloration, combined with a special environment to which it seems obviously due, renders it necessary to give it recognition till material is available for a final determination of its status.

L. l. hollisteri is intermediate in coloration and geographically between *nyanzæ* and *massaicus*, but presents marked differences in character of pelage and in coloration from either. Its separation from *massaicus* was made by Hollister in his revision of the East African forms of lions.

The leading features of these four forms of lions may be presented in brief synopsis as follows:

Pelage very short.
    Size largest; coloration pale buff. Savannah district of northeastern Belgian Congo. . . . . *azandicus.*
    Size medium (?); coloration "tawny ochraceous." Northern and probably western borders of Victoria Nyanza. . . . . *nyanzæ.*
    Size smallest; coloration decidedly grayish. British and German East Africa, eastward from the Victoria Nyanza drainage. . . . . *massaicus.*
Pelage much longer.
    Size medium; coloration between that of *azandicus* and *nyanzæ*. Eastern drainage of the Victoria Nyanza basin. *hollisteri.*

As a further distinction it may be noted that the ventral surface and the inside of limbs are creamy white in *hollisteri*, pale buff in *azandicus*, deep buff in *nyanzæ*, and pale grayish buff in *massaicus*.

No material is available for a comparison of *Leo l. azandicus* with the West African forms, to which it is probably more nearly related than to any of the East African races. The West African forms are *Leo leo senegalensis* of the coast region of Senegal and *L. l. kamptzi* of the Cameroon coast region. On geographical grounds it is fair to assume that neither of them is racially identical with *azandicus*. *L. l. bleyenberghi*,[1] of southeastern Belgian Congo, also requires comparison with *azandicus*, although the type districts of the two are separated by nearly one thousand miles of latitude. No material, however, for such comparison is at hand.

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[1] The type locality of *Felis leo bleyenberghi* Lönnberg is Katanga, near the Rhodesia border of Belgian Congo (1913, Rev. Zool. Africaine, III, fasc. 2, p. 273). Later Lönnberg (1917, Kungl. Sven. Vetensk. Ak. Handl., Stockholm, LVIII, No. 2, April, pp. 47–49) referred to this subspecies three specimens from Kabare, Rutshuru, and Beni, in the Lake Kivu–Lake Albert Edward district.

Individual and Sexual Variation in the Skull and Teeth of Wild-Killed African Lions

The accompanying measurements (Tables A to M[1]) are intended in part as a record of not only the average relative size of series of skulls and of the teeth of three regional forms of African lions but also data illustrative of individual variation and, incidentally, of sexual variation. Hollister has already called attention to the fact that individual variation is much greater in females than in males. In his 'East African Mammals in the United States National Museum'[2] he says of *Leo leo massaicus*: "Skulls and teeth of females vary much more than do those of males. The range of variation in size of the teeth in lionesses from one locality is startling. There is great variation in the shape and size of the auditory bullæ in skulls from one locality." Under *L. l. nyanzæ* (*loc. cit.*, p. 164) he adds: "There is the same great variation in size of skull and teeth in the lioness as in *massaica*."

SKULL.—In Table H (p. 241) the range of variation is given for a few of the principal measurements of seven male and five female skulls (all from the same locality except one) of *Leo leo azandicus;* of four male and ten female skulls of *L. l. nyanzæ* (based on measurements published by Hollister); and of nine male and thirteen female skulls of *L. l. massaicus* (in part from Hollister). The difference between the largest and smallest specimen for both sexes of each form is given in millimeters (see upper section of the Table) and also in percentages (see lower section of the Table), the latter based on the respective averages for each form. The variation in the total length of skull in males ranges from 15 mm. in *nyanzæ* (based on only four skulls) to 36 mm. in *massaicus* (based on nine skulls). Doubtless a much greater range would be shown by larger series. The percentage of variation ranges from 4 to 10. This difference is two times greater than that between the averages of the three forms, based on the same specimens.

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[1] **Tables of Measurements**
Table A. External measurements of *Leo leo azandicus* (p. 235).
" B. " " " " " *nyanzæ* (p. 236).
" C. " " " " " *massaicus* (p. 236).
" D. Cranial measurements of *Leo leo azandicus* (p. 237).
" E. " " " " " *nyanzæ* (p. 238).
" F. " " " " " *massaicus* (pp. 238-239).
" G. Comparative summary of Tables D, E, F (p. 240).
" H. Amount and percentage of cranial variation for the three forms, based on Tables D–G (p. 241).
" I. Dental measurements of *Leo leo azandicus* (p. 242).
" J. " " " " " *nyanzæ* (p. 243).
" K. " " " " " *massaicus* (pp. 244-245).
" L. Comparative summary of Tables I, J, K (p. 246).
" M. Amount and percentage of dental variation for the three forms, based on Tables I–L (p. 247)

[2] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, p. 157.

The average per cent of variation in total length of skull in the females of the same forms (five skulls in the case of *azandicus*, ten for *nyanzæ*, thirteen for *massaicus*) is much greater than in males, not only relatively but absolutely, although the female skulls are nearly one-fourth smaller. This is especially true of the breadth of the skull, the percentage of variation in the zygomatic breadth of males being about 6.5 and in females about 14, with about the same proportionate divergence in the breadth at the base of the canines, at the interorbital constriction, and in the mastoid breadth. At most of these points the percentage of individual variation in females is about twice that of males. It is also much greater in females of *nyanzæ* than in females of either of the other two forms. Exceptional divergences from the averages occur in individuals of both sexes in each of the three forms.

TEETH.—The teeth of African lions are extremely variable in both size and form in both sexes. The upper carnassial in seven males of *Leol. azandicus* varies 4.5 mm. in length and 2.2 mm. in greatest breadth, giving a percentage of variation of about, respectively, 12 and 11. In five males of *nyanzæ* the percentage, respectively, is 14 and 11; in nine skulls of *massaicus*, 12 for the length and 18.8 for the breadth. In female skulls the breadth of the upper carnassial is much more variable than the length, the percentage for length in five female *azandicus* being 4.9, while the percentage for breadth is 13.4. In ten females of *nyanzæ* these percentages are respectively 9.9 and 15.7; in thirteen females of *massaicus*, they are 8.5 and 13. The upper carnassial in females is relatively shorter and broader than in males, and more variable in both size and form.

The lower molar varies about equally in both sexes, the percentage of variation ranging from about 10.9 in *massaicus* to about 19.9 in *nyanzæ*.

The vestigial upper molar is the most variable of all the teeth in both size and form, the percentage of variation in both length and breadth, in *azandicus* and *massaicus*, being respectively 25 to 27 for the axial and transverse dimensions.

The upper canine is also extremely variable in size in both sexes, but much more so in females than in males.

These statistics indicate that cranial and dental characters are not so stable a basis for the discrimination of regional forms as has been often assumed, and emphasizes the fact that, like color characters and general size, they may often prove misleading, especially when a supposed new form of a plastic group is based on a single specimen, since it may or may not (most likely the latter) represent the norm of the locality from which it was received. It is well to remember that the extremes of a large series from a single locality often differ much more from each other than the average difference between well-grounded regional forms.

Sexual Difference in Size in Lions

Female lions, as indicated by the few trustworthy external measurements available (Tables A-C), are about one-sixth smaller than males, in the three regional forms here under consideration. On the basis of greatest length and zygomatic breadth of the skull approximately the same sexual ratio of variation in size is shown. This is less than in African leopards, in which females are about one-fifth smaller than males.

Abnormality of Park-Reared Lions

Hollister has given an admirable exposition of the striking effect of life in the unnatural environment of captivity upon lions,[1] which should receive the closest study by all specialists in mammalogy. For purpose of comparison his cranial measurements of four lions (two males and two females) reared to full maturity in captivity, and whose complete life history is fully known, are included in the tables of measurements of *Leo leo massaicus* (Table F, *b*, p. 239). He has shown that park-reared specimens differ markedly from wild-killed individuals, not only in coloration but in size and in important cranial features, indicating clearly that such material is "valueless for systematic work." It is also highly misleading, and the many forms (species and subspecies) which have been based on such material are thus wholly discredited, especially in the larger Felidæ, among which many forms have been thus founded. Hollister has shown in much detail the parts of the skull most affected, and given as an explanation the great change in habits compelled by life in captivity. He says (Bulletin 99, p. 158): "The most conspicuous peculiarities of the McMillan lion skulls [skulls of *massaicus* brought alive to Washington as cubs from near Nairobi] and of other zoo-reared lions as well [including the four only known specimens of *Felis leo roosevelti* Heller], are the greater (relative and actual) zygomatic breadth, the large rostra, and the great distance across the base of the skull at the mastoids. While actually measuring less in condylobasal or greatest length than many of the wild *massaica* skulls of equal age, they have a far greater zygomatic breadth than any, averaging about 30 millimeters more in males, and 20 millimeters more in females." He also says (*loc. cit.*, p. 161): "In the case of the McMillan lions the capacity [of the braincase] is about 50 cubic centimeters less in males and about 40 less in females, than in wild-killed examples of equal age from the same locality."

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[1] Hollister, N., 1917, 'Some Effects of Environment and Habit on Captive Lions.' Proc. U. S. Nat. Mus., LIII, June 1, pp. 177–193, Pls. XXII–XXV. Abstract given under *Felis leo massaica* in his 'East African Mammals in the United States National Museum.' 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, pp. 157–161, Pls. LII–LV.

An indication of the general striking cranial differences between wild-killed and park-reared lions of the *massaicus* type is afforded by the ratio of the zygomatic breadth to the greatest length of the skull, which is as follows: average for wild-killed males, 66.8; for two park-reared males, 74.4. The average for wild-killed females is 66.4; for two park-reared females, 82.2.

Table A.—External Measurements of *Leo leo azandicus* from Northeastern Belgian Congo

Cat. No.	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot
52077	Faradje	♂	2730	1760	970	390
52078	"	♂	2780	1830	950	395
52084[1]	Vankerckhovenville	♂	2860	1830	1030	400
Average		**3 ♂**	**2790**	**1807**	**983**	**395**
52074	Faradje	♀	2330	1530	800	330
52075	"	♀	2400	1560	840	310
52073	"	♀	2240	1440	800	325
52080	"	♀	2430	1480	950	330
Average		**4 ♀**	**2350**	**1503**	**848**	**324**

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[1] Type.

Table B.—External Measurements of *Leo leo nyanzæ* from British East Africa (From Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 168, 169)

U. S. Nat. Mus. No.	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot
181569	Lime Springs, Sotik	♂	2740	1760	980	355
181570	" " "	♂	——	1730	——	355
181573	Kabalolot Hill	♂	2730	1720	1010	370
181577	Telek River	♂	2749	1835	914	375
162913	S. Guaso Nyiro R.	♂	2980	1950	1030	385
Average		**5 ♂**	**2799**	**1799**	**984**	**368**
181589	Loita Plains	♀	2380	1470	910	310
181590	" "	♀	2360	1520	840	315
181592	" "	♀	2550	1590	960	360
181578	Telek River	♀	2410	1490	920	335
181583	" "	♀	2551	1575	976	325
Average		**5 ♀**	**2450**	**1529**	**921**	**329**

Table C.—External Measurements of *Leo leo massaicus*[1] from British East Africa (From Hollister, *loc. cit.*)

U. S. Nat. Mus. No.	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot
161914	Wami Hill	♀	2380	1560	820	325
197137	Nairobi	♀	2134	1410	724	305
199524	"	♀	2422	1621	801	336
Average		**3 ♀**	**2312**	**1530**	**782**	**322**

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[1] No external measurements of males available.

Table D.—Cranial Measurements of Twelve Adults of *Leo leo azandicus* from Northeastern Belgian Congo

Cat. No.	Locality	Sex	Greatest Length	Condylobasal Length	Basal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Postorbital Constriction	Mastoid Breadth	Breadth Mesopterygoid Fossa	Breadth across p^4-p^4	Length Nasals		Length Mandible
													Middle	Outside	
52072	Faradje	♂	380	—	330	246	99.0	74.8	62.6	141.4	48.5	128.7	89.6	115.3	253
52084[1]	Vankerckhovenville	♂	375	335	315	245	99.0	77.5	64.3	134.3	51.7	133.4	93.8	111.5	243
52078	Faradje	♂	370	325	315	250	98.2	79.5	67.4	142.5	51.4	133.3	97.9	119.2	243
52082	"	♂	368	335	320	255	96.9	78.5	66.0	139.6	48.7	129.0	106.0	118.5	250
52079	"	♂	365	—	312	240	95.0	66.5	64.5	138.3	49.8	127.0	88.7	114.0	245
52077	"	♂	360	323	310	253	95.4	73.5	68.2	141.3	48.5	124.6	95.6	119.0	237
52076	"	♂	355	—	297	243	91.0	72.7	63.7	132.7	51.7	128.2	87.2	107.6	238
Average		**7 ♂**	**369**	**330**	**314**	**248**	**96.4**	**74.7**	**65.2**	**138.6**	**50.0**	**129.2**	**94.1**	**115.0**	**244**
52081	Faradje	♀	305	270	260	210	85.5	61.8	60.1	115.8	—	121.8	68.5	85.3	203
52075	"	♀	305	265	250	210	85.2	63.0	53.0	126.8	46.3	119.5	67.8	85.5	204
52074	"	♀	300	265	250	203	81.0	56.0	62.4	117.7	45.5	114.5	73.3	92.8	202
52080	"	♀	295	267	252	184	75.0	60.4	58.2	112.5	38.4	118.2	59.5	76.2	198
52073	"	♀	280	260	245	197	77.5	67.1	65.0	112.0	44.3	100.5	66.0	78.5	196
Average		**5 ♀**	**297**	**265**	**251**	**201**	**80.8**	**61.7**	**59.7**	**117.0**	**43.6**	**114.9**	**67.0**	**83.7**	**201**

[1] Type.

Table E.—Cranial Measurements of Fourteen Adults of *Leo leo nyanzæ* from British East Africa (From Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 166, 167)

U. S. Nat. Mus. No.	Locality	Sex	Greatest Length	Condylobasal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Mastoid Breadth	Greatest Length Nasals	Length Mandible
181571	Lime Springs, Sotik	♂	368	324	243	98	71	135	114	255
181577	Telek River	♂	356	318	235	93	70	132	103	245
162913	S. Guaso Nyiro R.	♂	371	329	251	98	74	144	106	255
162919	Njoro Osolali	♂	356	321	235	92	66	132	104	242
Average		**4 ♂**	**363**	**323**	**241**	**95**	**70**	**136**	**107**	**249**
Paratype[1]	Mulema, Uganda	♂	363	324	230	—	74	—	116	237
181589	Loita Plains	♀	296	269	202	80	62	117	87	208
181572	Kabalolot Hill	♀	291	266	187	81	62	109	92	207
181930	" "	♀	300	264	206	84	61	115	92	206
181578	Telek River	♀	284	256	180	75	58	105	85	196
181583	" "	♀	309	278	202	86	63	117	98	211
162916	Njoro Osolali	♀	313	281	204	88	66	123	93	212
162914	S. Guaso Nyiro R.	♀	277	254	185	75	56	113	79	199
162915	" "	♀	299	268	203	84	54	118	89	205
162917	" "	♀	302	272	196	80	60	115	89	208
162918	" "	♀	285	261	198	89	55	113	87	203
Average		**10 ♀**	**296**	**267**	**196**	**82**	**60**	**115**	**89**	**206**

Table F, *a*.—Cranial Measurements of Seven Adults of *Leo leo massaicus* from Vicinity of Lake Naivasha, British East Africa (Specimens Collected and Presented by Paul J. Rainey to The American Museum of Natural History)

Cat. No.	Locality	Sex	Greatest Length	Condylobasal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Mastoid Breadth	Greatest Length Nasals	Length Mandible
30242	Near Lake Naivasha	♂	363	312	233	93.3	68.0	137.5	101.7	238
30247	" " "	♂	355	315	245	95.3	71.0	133.7	93.0	238
30244	" " "	♂	357	310	235	92.7	73.4	136.1	104.0	238
30248	" " "	♂	—	—	248	93.2	76.0	—	107.8	250
36420	" " "	♂	354	313	240	92.8	68.2	133.3	106.0	239
Average		**5 ♂**	**357**	**312**	**240**	**93.5**	**71.3**	**135.2**	**102.5**	**241**
30243	Near Lake Naivasha	♀	298	270	195	89.6	59.5	117.5	66.6	197
30245	" " "	♀	300	265	196	78.0	59.6	115.0	88.5	200

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[1] From Heller, 1913, Smithsonian Misc. Coll., LXI, No. 19, November 8, p. 5.

Table F, *b*.—Cranial Measurements of Nineteen Adults of *Leo leo massaicus* from British East Africa (From Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 166, 167)

U. S. Nat. Mus. No.	Locality	Sex	Greatest Length	Condylobasal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Mastoid Breadth	Greatest Length Nasals	Length Mandible
174742	Mt. Kilimanjaro	♂	351	318	241	94	68	132	104	241
182297	Kapiti Station	♂	373	322	248	100	71	135	110	257
155443	Nairobi	♂	373	335	234	92	70	135	118	256
163328	Laikipia Plat.	♂	337	316	233	92	75	133	107	235
Average	(Wild-killed)	**4 ♂**	**358**	**323**	**239**	**95.0**	**71**	**134**	**110**	**247**
197944[1]	Nairobi	♂	345	309	261	96	78	146	97	248
199707[1]	"	♂	363	325	264	104	80	152	101	260
174744	Mt. Kilimanjaro	♀	301	270	195	79	60	116	88	207
182308	Ulu Station	♀	290	259	195	80	58	115	90	202
182293	Kapiti Station	♀	294	264	203	81	63	120	86	203
182324	" "	♀	299	266	185	78	57	111	90	200
182326	" "	♀	299	267	204	80	60	117	91	210
182421	" "	♀	292	262	192	76	58	119	88	203
182423	" "	♀	282	254	180	74	54	112	80	198
161914	Wami Hill	♀	291	258	192	77	58	114	86	196
163109	Laikipia Plat.	♀	295	269	195	81	67	112	97	212
163329	" "	♀	307	273	193	81	60	115	100	209
163108	N. Guaso Nyiro R.	♀	298	264	195	81	64	112	93	200
Average	(Wild-killed)	**11 ♀**	**295**	**264**	**194**	**79**	**60**	**114**	**90**	**204**
197137[1]	Nairobi	♀	291	265	209	81	59	120	89	200
199524[1]	"	♀	300	265	224	84	64	119	87	206

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[1] Raised in captivity and abnormal. Excluded from the averages and extremes.

Table G.—Comparative Summary of Cranial Measurements of Adult Lions from Northeastern Belgian Congo and British East Africa, all Strictly Comparable as to Age (Based on Tables D, E, and F)

Regional Form	Sex	No. of Specimens		Greatest Length	Condylobasal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Mastoid Breadth	Greatest Length Nasals	Length Mandible
Leo leo azandicus	♂	7	Average	369	330	248	96	75	139	115	244
" " *nyanzæ*	♂	4	"	363	323	241	95	70	136	107	249
" " *massaicus*	♂	9	"	358	318	240	94	71	135	106	244
Leo leo azandicus	♂	7	Minimum	355	323	240	91	67	133	108	237
" " *nyanzæ*	♂	4	"	356	318	235	92	66	132	103	242
" " *massaicus*	♂	9	"	337	310	233	92	60	132	102	238
Leo leo azandicus	♂	7	Maximum	380	335	255	99	80	143	119	253
" " *nyanzæ*	♂	4	"	371	329	251	98	74	144	114	255
" " *massaicus*	♂	9	"	373	335	248	100	75	137	118	257
Leo leo azandicus	♀	5	Average	297	265	201	81	62	117	84	201
" " *nyanzæ*	♀	10	"	296	267	196	82	60	115	89	206
" " *massaicus*	♀	13	"	295	264	195	80	60	115	88	203
Leo leo azandicus	♀	5	Minimum	280	260	184	75	56	112	76	196
" " *nyanzæ*	♀	10	"	277	254	180	75	54	105	85	196
" " *massaicus*	♀	13	"	282	254	180	74	54	111	86	196
Leo leo azandicus	♀	5	Maximum	305	270	210	86	67	127	93	204
" " *nyanzæ*	♀	10	"	313	281	206	89	66	123	98	212
" " *massaicus*	♀	13	"	307	273	204	81	67	120	100	212

Table H.—Amount and Percentage of Variation in Cranial Measurements of Adult Lions from Northeastern Belgian Congo, and from British East Africa (Based on Tables D–G)

Regional Form	Sex	No. of Specimens	Greatest Length	Condylobasal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Mastoid Breadth	Greatest Length Nasals	Length Mandible
Amount of Variation (in millimeters)										
Leo leo azandicus	♂	7	25	12	15	8	13	10	11	16
“ “ *nyanzæ*	♂	4	15	11	16	6	8	12	11	13
“ “ *massaicus*	♂	9	36	25	15	8	15	5	16	19
Leo leo azandicus	♀	5	25	10	26	11	11	15	17	8
“ “ *nyanzæ*	♀	10	36	27	26	14	12	18	13	16
“ “ *massaicus*	♀	13	25	19	24	7	13	9	14	16
Percentage of Variation (based on averages)										
Leo leo azandicus	♂	7	6.8	3.7	6.0	8.3	17.3	7.2	9.5	6.5
“ “ *nyanzæ*	♂	4	4.1	3.4	6.6	6.3	11.0	8.8	10.0	5.2
“ “ *massaicus*	♂	9	10.0	7.8	6.3	8.5	21.1	3.7	15.0	7.8
Leo leo azandicus	♀	5	8.4	3.7	12.9	13.6	17.7	12.8	20.2	3.9
“ “ *nyanzæ*	♀	10	12.2	10.1	13.2	17.0	20.0	15.6	14.6	7.8
“ “ *massaicus*	♀	13	8.4	7.2	12.3	8.7	21.7	7.9	15.9	7.8

Table I.—Dental Measurements of Twelve Adults of *Leo leo azandicus* from Northeastern Belgian Congo

Cat. No.	Locality	Sex	Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	p^2-p^4	p_3-m_1	p^2-p^4	Upper Carnassial	Upper Molar	Length of m_1
52072	Faradje	♂	115.2	132.7	28.9	78.5	76.8	68.7	39.5×18.7	11.1×5.7	29.6
52084[1]	Vankerckhovenville	♂	115.5	135.4	27.6	79.3	75.2	67.1	40.5×20.1	11.1×6.2	30.4
52078	Faradje	♂	118.1	138.3	28.6	73.5	74.3	61.1	36.0×17.9	13.0×6.4	27.6
52082	"	♂	111.7	132.2	28.3	76.8	72.7	61.8	37.4×18.7	11.4×5.7	28.7
52079	"	♂	111.5	132 2	28.5	77.1	72.3	63.8	37.4×18.4	12.5×6.2	28.4
52077	"	♂	118.8	128.7	27.4	75.6	75.2	64.5	38.7×19.0	11.7×6.2	28.4
52076	"	♂	109.5	127.6	25.1	72.0	72.2	58.2	36.1×18.3	10.5×4.8	26.2
Average		**7 ♂**	**114.3**	**132.5**	**27.8**	**76.1**	**74.1**	**63.6**	**37.9×18.7**	**11.6×5.9**	**28.4**
52081	Faradje	♀	97.1	113.3	23.4	69.7	67.5	59.5	35.3×16.8	11.5×6.3	27.8
52075	"	♀	99.2	114.4	24.8	66.4	64.3	56.5	34.4×17.6	11.0×4.8	24.5
52074	"	♀	97.1	111.5	25.0	68.9	67.5	58.7	35.5×16.8	9.6×5.0	26.4
52080	"	♀	93.2	117.7	21.8	65.8	67.2	56.2	33.9×19.2	10.1×5.2	25.0
52073	"	♀	92.0	109.2	22.0	65.5	62.8	54.7	33.8×19.0	9.2×4.1	24.2
Average		**5 ♀**	**95.7**	**113.2**	**23.4**	**67.3**	**65.9**	**57.1**	**34 6×17.9**	**10 3×5 1**	**25.6**

[1] Type.

Table J.—Dental Measurements of Fifteen Adults of *Leo leo nyansæ* from British East Africa (From Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 166–169)

U. S. Nat. Mus. No.	Locality	Sex	Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	Upper Carnassial	Length of m_1
181571	Lime Springs, Sotik	♂	108	125	27.9	40.8×19.5	30.6
181574	Kabalolot Hill	♂	106	118	24.3	35.3×17.4	24.9
181577	Telek River	♂	109	125	26.1	37.3×18.8	28.8
162913	S. Guaso Nyiro R.	♂	114	132	26.7	37.9×19.4	28.2
162919	Njoro Osolali	♂	111	128	27.5	39.7×18.5	30.6
Average		5♂	**109.6**	**125.6**	**26.5**	**38.2×18.7**	**28.6**
181589	Loita Plains	♀	95	109	21.3	33.0×15.3	25.0
181572	Kabalolot Hill	♀	98	111	22.5	35.3×16.4	25.5
181930	" "	♀	99	111	23.3	34.4×16.4	25.1
181578	Telek River	♀	94	107	21.3	34.5×16.4	25.2
181583	" "	♀	99	115	22.8	32.8×15.8	25.2
162916	Njoro Osolali	♀	102	113	22.8	36.2×17.8	25.5
162914	S. Guaso Nyiro R.	♀	94	114	19.6	———	22.7
162915	" "	♀	95	110	23.0	34.4×17.9	25.7
162917	" "	♀	98	111	20.4	33.0×16.5	23.4
162918	" "	♀	94	106	21.2	35.7×17.1	24.9
Average		10♀	**96.8**	**110.7**	**21.8**	**34.4×16.6**	**24.8**

Table K, *a*.—Dental Measurements of Seven Adults of *Leo leo massaicus* from Vicinity of Lake Naivasha, British East Africa (Specimens Collected and Presented by Paul J. Rainey to The American Museum of Natural History)

Cat. No.	Locality	Sex	Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	Length of Upper Carnassial	Upper Molar	Length of m_1
30242	Near Lake Naivasha	♂	106.8	123.3	28.5	35.8	10.6×6.5	25.7
30247	" " "	♂	103.5	121.8	27.6	36.3	10.2×5.0	27.5
30244	" " "	♂	107.0	121.2	27.7	37.0	12.4×5.5	26.0
30248	" " "	♂	107.4	128.0	26.6	37.1	10.7×5.5	26.8
36420	" " "	♂	112.0	124.5	26.6	37.8	11.8×5.3	28.0
Average		**5 ♂**	**107.3**	**123.8**	**27.4**	**36.8**	**11.1×5.6**	**26.8**
30243	Near Lake Naivasha	♀	93.3	109.2	20.3	35.0	11.3×4.5	26.0
30245	" " "	♀	93.6	107.0	22.0	34.0	11.0×4.7	24.6

Table K, *b*.—Dental Measurements of Nineteen Adults of *Leo leo massaicus* from British East Africa (From Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 166–169)

U. S. Nat. Mus. No.	Locality	Sex	Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	Upper Carnassial	Length of m_1
174742	Mount Kilimanjaro	♂	109	126	26.2	35.4×16.4	25.6
182297	Kapiti Station	♂	112	128	27.8	40.0×19.9	28.6
155443	Nairobi	♂	116	133	27.8	39.3×18.9	28.8
163328	Laikipia Plat.	♂	112	127	24.4	38.0×19.1	27.7
Average	(Wild-killed)	**4♂**	**112.1**	**129**	**26.6**	**38.2×18.6**	**27.7**
197944[1]	Nairobi	♂	108	127	23.0	35.8×18.1	28.2
199707[1]	“	♂	113	131	25.2	37.9×19.7	27.6
174744	Mount Kilimanjaro	♀	94	108	21.8	34.0×16.2	24.2
182308	Ulu Station	♀	93	110	23.6	35.4×17.7	25.1
182293	Kapiti Station	♀	96	108	21.9	35.2×17.1	25.3
182324	“ “	♀	94	108	20.9	33.9×16.8	25.3
182326	“ “	♀	95	108	19.4	33.2×15.5	23.9
182421	“ “	♀	93	106	21.9	32.5×16.3	23.3
182423	“ “	♀	91	105	21.2	33.1×17.0	24.6
161914	Wami Hill	♀	91	104	21.7	33.4×15.6	24.2
163109	Laikipia Plat.	♀	98	115	23.5	33.2×17.5	25.1
163329	“ “	♀	99	115	21.2	33.9×17.4	25.9
163108	N. Guaso Nyiro R.	♀	98	112	22.8	35.0×17.3	25.6
Average	(Wild-killed)	**11♀**	**94.8**	**109**	**21.8**	**33.9×16.8**	**24.8**
197137[1]	Nairobi	♀	93	105	19.1	33.6×15.2	23.8
199524[1]	“	♀	92	104	19.2	32.5×15.4	22.9

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[1] Reared in captivity. Added for comparison but excluded in computing the averages.

Table L.—Comparative Summary of Dental Measurements of Adult Lions from Northeastern Belgian Congo and British East Africa (Based on Tables I, J and K)

Regional Form	Sex	No. of Specimens		Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	Upper Carnassial	Length of m_1
Leo leo azandicus	♂	7	Average	114.3	132.5	27.8	37.9×18.7	28.4
" " *nyanzæ*	♂	5	"	109.6	125.6	26.5	38.2×18.7	28.6
" " *massaicus*	♂	9	"	109.5	125.9	27.0	37.4×18.6	27.2
Leo leo azandicus	♂	7	Minimum	109.5	127.6	25.1	36.0×17.9	26.2
" " *nyanzæ*	♂	5	"	106.0	118.0	24.3	35.3×17.4	24.9
" " *massaicus*	♂	9	"	103.5	121.2	24.4	35.4×16.4	25.6
Leo leo azandicus	♂	7	Maximum	118.8	138.3	28.9	40.5×20.1	30.4
" " *nyanzæ*	♂	5	"	114.0	132.0	27.9	40.8×19.5	30.6
" " *massaicus*	♂	9	"	116.0	133.0	28.5	40.0×19.9	28.8
Leo leo azandicus	♀	5	Average	95.7	113.2	23.4	34.6×17.9	25.6
" " *nyanzæ*	♀	10	"	96.8	110.7	21.8	34.4×16.6	24.8
" " *massaicus*	♀	13	"	94.5	108.9	21.8	33.9×16.8	24.8
Leo leo azandicus	♀	5	Minimum	92.0	109.2	21.8	33.8×16.8	24.2
" " *nyanzæ*	♀	10	"	94.0	106.0	19.6	32.8×15.3	22.7
" " *massaicus*	♀	13	"	91.0	104.0	19.4	32.5×15.5	23.3
Leo leo azandicus	♀	5	Maximum	99.2	117.7	25.0	35.5×19.2	27.8
" " *nyanzæ*	♀	10	"	102.0	115.0	23.3	36.2×17.9	25.7
" " *massaicus*	♀	13	"	99.0	115.0	23.6	35.4×17.7	26.0

Table M.—Amount and Percentage of Variation in Dental Measurements of Adult Lions from Northeastern Belgian Congo, and British East Africa (Based on Tables I–L)

Regional Form	Sex	No. of Specimens	Upper Toothrow c-p^4 (inclusive)	Lower Toothrow c-m_1	Upper Canine, length at alv. border	Upper Carnassial	Length of m_1
Amount of Variation (in millimeters)							
Leo leo azandicus	♂	7	9.3	10.7	3.8	4.5×2.2	4.2
" " *nyanzæ*	♂	5	8.0	14.0	3.6	5.5×2.1	5.7
" " *massaicus*	♂	9	12.5	11.8	4.1	4.6×3.5	3.2
Leo leo azandicus	♀	5	7.2	8.5	3.2	1.7×2.4	3.6
" " *nyanzæ*	♀	10	8.0	9.0	3.7	3.4×2.6	3.0
" " *massaicus*	♀	13	8.0	11.0	4.2	2.9×2.2	2.7
Percentage of Variation (based on averages)							
Leo leo azandicus	♂	7	8.1	8.5	13.6	11.9×11.7	14.7
" " *nyanzæ*	♂	5	7.3	11.1	13.6	14.4×11.2	19.9
" " *massaicus*	♂	9	11.4	9.3	15.2	12.3×18.8	11.7
Leo leo azandicus	♀	5	7.5	7.5	13.7	4.9×13.4	14.1
" " *nyanzæ*	♀	10	8.3	8.1	16.9	9.9×15.7	12.1
" " *massaicus*	♀	13	8.4	10.1	19.2	8.5×13.1	10.9

PANTHERA Oken

Panthera Oken, 1816, 'Lehrb. Naturg.,' Th. 3, Abth. 2, p. 1052. Type, by tautonymy, *P.[anthera] vulgaris* Oken = *Felis panthera* Schreber (plate name) = *Felis pardus* Linnæus.

The leopards of both Africa and Asia, as at present understood, form a group of subspecies of *Felis pardus* Linnæus, differing from all other felines sufficiently to be accorded the rank of a full genus, in the opinion of several of the earlier as well as recent taxonomers, while others hold to the old view that lions, tigers and leopards are congeners of the domestic cat. It is necessary to consider only the African forms in the present connection. The genus is represented in North and South America by the *Felis onca* group.

Nomenclature and Type Localities of African Leopards

The name commonly accepted for the leopard group is of course *Felis pardus* Linnæus (1758). The most that can be said for it is that it was probably intended to designate the pard or panther of pre-Linnean authors. The slight diagnosis, aided by the principle of exclusion, is open to this interpretation. As has been repeatedly noted by commentators, and especially by Thomas,[1] "Habitat in Indiis" gives no basis for a type locality, and Linnæus' citations of authors afford no assistance. His first reference is to edition six of his 'Syst. Nat.,' (p. 4, No. 3), where he cites Ray 'Quadr.,' p. 166, and 'Alp. Aegypt.,' p. 237, neither of which bears on the matter of a type locality. To quote Thomas (*loc. cit.*, p. 135): "Ray gives no indication of locality, but passing to Alpinus we find an account of Leopards seen at Cairo and Alexandria alive in captivity. The account is, no doubt, partly based on Hunting Leopards (*Cynælurus*), but, none the less, may be accepted as giving for the type locality: Egypt." The objections to this ruling are (1) that the leopards seen in captivity by Alpinus at Cairo and Alexandria must have come either from some point far up the Nile[2] or from Arabia; (2) they may more probably have been hunting leopards than true leopards; (3) Linnæus' *Felis pardus* was in all probability a composite of both, and included also the Mexican jaguar. If the name had any other origin than Linnæus it would under modern standards have been long since ruled out as indeterminate. If it is to be retained on the basis that it has primary relation to panthers and leopards, as known to pre-Linnean writers, its type locality should be restricted on the basis of the first author who gave an intelligent description of the species based on specimens from a known locality. The first authors to make this contribution were Buffon and Daubenton, three years after the publication of Linnæus' tenth edition of his 'Systema Naturæ.'[1] Buffon says (*loc. cit.*), p. 151: "La première espèce de ce genre, & qui se trouve dans l'ancien continent, est la grande panthère que nous appelerons simplement *Panthère* (pl. xi & xii), qui étoit connue des Grecs sous le nom de *Pardalis*, des anciens Latins sous celui de *Panthera*, ensuite sous le nom de *Pardus*, & des Latins modernes sous celui de *Leopardus*." These names are all cited from Gesner (1620, 'Hist. Anim. Quadr.,' 2d. Ed., I, p. 824) by Linnæus (1758, 'Syst. Nat.,' 10th Ed., I, p. 41) and form his second reference under his *Felis pardus*.

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[1] Thomas, Oldfield, 1911, 'The Mammals of the Tenth Edition of Linnæus: an Attempt to fix the Types of the Genera and the exact Bases and Localities of the Species.' Proc. Zoöl. Soc. London, I, pp. 120–158. See also Cabrera, 1910, Bol. Soc. Española Hist. Nat., Madrid, X, pp. 422–427; idem, 1918, XVIII, pp. 472–482, Pls. xvi-xvii.

[2] "Il, n'y point de lions, ni de Tigres, ni de léopards en Égypte."—Mascrier, 1740, 'Descript. de l'Égypte.' II, p. 125, as quoted by Buffon.

In respect to the source of his material Buffon says: "La panthère que nous decrivons ici & deux autres de la même espèce, qui étoient en même temps à la ménagerie du Roi, sont venues de la Barbarie: la régence d'Alger fit présent à Sa Majesté des deux premières, il y a dix ou douze ans; la troisième a été achetée pour le Roi, d'un Juif d'Alger" (*loc. cit.*, p. 160). The description of the external form, by Daubenton, is from a male (figured, Plate XI); the account of the color and markings is from a female (figured, Plate XII). Each of the three animals enumerated by Buffon is mentioned individually by Daubenton in his description.

Following a well established custom in designating a type locality for a composite species when none was originally indicated, I designate Algeria as the type locality of *Felis pardus* (*s.s.*) Linnæus, on the basis of La Panthère of Buffon and Daubenton, and thus establish a starting point for the nomenclature for the leopards of Africa.

Schreber's plate bearing the name "*Felis panthera* Buff." (1775, 'Säugthiere,' Pl. XCIX) is an acknowledged copy of Buffon's Plate XII (cf. 1777, 'Säugthiere,' III, p. 586), and is therefore a synonym of *Felis pardus* Linnæus, and was so treated in the later published text (1777, 'Säugthiere,' III, pp. 384, 385).

Erxleben's *Felis pardus* (1777, 'Syst. Reg. Anim.,' p. 505) without his references to Buffon and Schreber would be as geographically indeterminate as Linnæus'.

The name *Felis leopardus* of nomenclators also has its basis in Buffon and Daubenton's "Le Léopard" (*loc. cit.*, pp. 153–154, 168–171,

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[1] Buffon and Daubenton, 1761, 'Hist. Nat.,' IX, pp. 151–172 (Buffon), pp. 173–178 (Daubenton), Pls. XI, XII.

189–200, Pl. xiv). The leopard is informally described in the section of the text devoted to the "Description de la partie du Cabinet qui a rapport à l'Historie Naturelle du Tigre, de la Panthère, de l'Once et du Léopard" which enumerates or describes various skins, skeletons and anatomical preparations, mainly of the leopard. The description of the leopard is captioned "La peau d'un léopard" (pp. 190–192), with a reference to Plate xiv where the animal is figured. There is also a figure of the skeleton (Pl. xvii). The description of the animal is detailed but affords no information as to the original source of the specimen described, nor of any of the leopard material mentioned. Buffon, however, gives the following (*loc. cit.*, pp. 153–154): "La troisième espèce, dont les Anciens ne sont aucune mention, est un animal du Sénégal, de la Guinée & des autres pays méridionaux que les Anciens n'avoient pas découverts: nous l'appellerons Léopard (pl. xiv) qui est le nom qu'on a mal-à-propos appliqué à la grande panthère, & que nous employerons, comme l'ont fait plusieurs Voyageurs, pour désigner l'animal du Sénégal, dont il est ici question. Il est un peu plus grand que l'once, mais beaucoup moins que le panthère. . . ." A further comparison with the panther is given (*loc. cit.*, pp. 168–171), in part as follows: "Le léopard a les mêmes mœurs & le même naturel que la panthère; & je ne vois nulle part qu'on l'ait apprivoisé comme l'once; ni que les nègres du Sénégal & de Guinée où il est très-commun, s'en soient jamais servis pour la chasse. . . . Ce Léopard du Sénégal ou de Guinée, auquel nous avons appliqué particulièrement le nom de *Léopard*, est probablement l'animal que l'on appelle à Congo *Engoi*. . . ."

As Buffon's *leopard* is the basis of the systematic name *Felis leopardus*, which originated with Schreber[1] and was adopted by Erxleben,[2] the type region of *Felis leopardus* is Senegal, on the authority of Buffon. This has been distinctly recognized by various later authors; many others have given it a range coextensive with that of *Felis pardus*, both species having been assigned to Asia as well as to Africa.[3]

Griffith, in 1827, published a drawing made by Hamilton Smith from "one of the several Felinæ, called Panthers, now in the Paris Museum." This drawing is the basis of Griffith's "Panther of the Ancients",[4] to which in Volume V of the same work (*loc. cit.*, V, p. 165, No. 424) he gave the technical name "*F.*[*elis*] *Pardus Antiquorum*," "Hamilton Smith, MSS.," and added: "Habitat?" Some four years later Sykes[1] said of the leopard of Dukhun, India: "It exactly resembles the animal figured as the *Panther of the ancients* in Mr. Griffiths's Translation of the 'Règne Animal'." Doubtless for this reason Fitzinger assigned Griffith's name, although clearly indeterminate, to his "Der indische Panther (*Panthera antiquorum*)."[2] Several later authors have also accepted this assignment.

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[1] 1775, 'Saugthiere,' Pl. ci (copied from Buffon), carrying the plate legend "*Felis leopardus* Buff."; idem, 1777, III, p. 387.

[2] 1777, 'Syst. Reg. Anim.,' p. 509.

[3] Two authors may be cited in illustration: Jardine (1834, 'Nat. Hist. Felinæ,' pp. 267–268) says of *Felis leopardus:* "Inhabits India and Africa. Most abundant, perhaps, in the former. Form slender and elegant. Distinctions between this and the last [*Felis pardus*] not yet well defined."

Matschie as late as 1895 (Sitzungsb. Ges. Naturf. Freunde Berlin, pp. 198–199) assigned his *Leopardus pardus leopardus* to his "Westafrikanisches Gebiet."

[4] 1827, 'Cuvier's Animal Kingdom,' II, p. 166 and facing plate.

In 1832, Ehrenberg described[3] a pale form of leopard from Arabia as "*Felis, Pardus* Linné?, *Nimr*" from two skins, "I. arabicæ," "II. habessinicæ." The first, from Arabia, served as the principal basis of his description, of his detailed table of measurements, and of his plate (Pl. XVII), which is inscribed, "*Felis nimr.* ex Arabia felici." The other specimen, from Abyssinia, was in poor condition. He states regarding the localities of his specimens: "In Arabia felici Syria et Habessinia pelles eas vidi, quas supra descripsi." He mentions having seen a wild leopard in Nubia as it was running at a distance of one hundred paces. The type locality of *Felis nimr* Ehrenberg is thus Arabia; not Nubia, nor Dongola,[4] nor even Abyssinia, as usually supposed.

In 1869 Fitzinger adopted[5] the name *Felis nimr* Ehrenberg for the leopard of East Africa, his "Der ostafrikanische Panther (*Panthera nimr*)," giving its range as "Ost-und Süd-Afrika und der mittlere Theil von West-Asien. In Afrika ist diese Form von Nubien durch Sennaar, Kordofan, Abyssinien, die Habab-, Danakil- und Somàli-Länder bis an das Cap der guten Hoffnung verbreitet, in Asien durch das peträische Arabien, Syrien und Armenien bis nach Persien und in die Tartarei, wo sie noch am Südrande des Aral-See's getroffen wird. Nördlich reicht sie bis an den Kaukasus." Later Matschie also made use[6] of the name *nimr* for the East African leopards collectively.

Felis leopardus var. *melanotica* Günther,[7] although founded on a melanistic phase from Grahamstown, Cape Colony, is available for the form of the Cape region, which differs in size and character of pelage from the more northern tropical forms.

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[1] 1831, Proc. Zool. Soc. London, August, p. 102.

[2] 1868 (1869), Sitzungsb. Ak. Wiss. Wien, LVIII, Abth. 1, pp. 406–408.

[3] 'Symb. Phys.,' Dec. II, Pl. xvii and accompanying text (unpaged).

[4] De Winton states: "Ehrenberg separated the African leopard from the Asiatic form, and the distinguishing subspecific name *nimr*, which he bestowed upon the former, is generally applied to this race with solid spots on the shoulders. It is mentioned as occurring in the Province of Dongola." (W. E. de Winton in Anderson's 'Zool. of Egypt,' Mamm., 1902, p. 183.)

[5] 1868 (1869), Sitzungsb. Ak. Wiss. Wien, LVIII, Abth. 1, pp. 401–466.

[6] 1895, 'Säugethiere Deutsch-Ost-Afrikas,' p. 60.

[7] 1885, Proc. Zool. Soc. London, p. 243, Pl. xvi; idem, 1886, p. 203, with text figure.

In 1900 Neumann proposed[1] the name *Felis leopardus suahelicus* (Pls. XLII and XLIII) to replace *Felis* (*Leopardus*) *nimr* Matschie (*loc. cit.*), claiming that the large-spotted form of leopard of East Africa had not previously been named. He gave no description and indicated no type locality, the name *suahelicus* being a substitute name for the form Matschie had designated as *nimr*. He mentions having received skins of this form from various localities in German East Africa, from Ugogo to Uganda. On this account Hollister, in 1918,[2] said: "Type locality may be restricted to some point in northeastern German East Africa." I here further restrict it to the Lake Manyara district, north Ugogo, one of the first localities mentioned by Neumann as one of the sources of his material.

Five other supposed forms of leopards have been described during the last eighteen years from that portion of Africa east of the Upper Nile region between northern Somaliland and northern German East Africa, making seven East African forms in all, while South Africa has only one (not yet generally recognized) and West Africa has also two, the *Panthera pardus leopardus* of Senegal and *Panthera pardus reichenowi* of Cameroon. They are listed in chronological sequence, with their respective type localities.

Forms of African Leopards

1758. *Panthera pardus pardus* (Linnæus). (*Felis pardus* Linnæus.) Algeria. (See above, pp. 248–249.)

1775. *Panthera pardus leopardus* (Schreber). (*Felis leopardus* Schreber.) Senegal. (See above, pp. 249–250.)

1832. *Panthera pardus nimr* (Ehrenberg). (*Felis nimr* Ehrenberg.) Arabia. (See above, p. 251.)

1885. *Panthera pardus melanotica* (Günther). (*Felis leopardus* var. *melanotica* Günther.) Grahamstown, Cape Colony. (See above, p. 251.)

1900. *Panthera pardus suahelica* (Neumann). (*Felis leopardus suahelicus* Neumann.) Lake Manyara district, northeastern German East Africa. (See above, p. 252.)

1904. *Panthera pardus nanopardus* (Thomas). (*Felis pardus nanopardus* Thomas.) Forty miles west of Gorahai, Somaliland. (Ann. Mag. Nat. Hist., (7) XIV, p. 94.)

1906. *Panthera pardus ruwenzorii* (Camerano). (*Felis pardus ruwenzorii* Camerano.) Bujungolo, Ruwenzori. (Bol. Mus. Zool. Anat., Torino, XXI, No. 545, p. 1.)

1913. *Panthera pardus fortis* (Heller). (*Felis pardus fortis* Heller.) Loita Plains, Southern Guaso Nyiro District, British East Africa. (Smithsonian Misc. Coll., LXI, No. 19, p. 5.)

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[1] 1900, Zool. Jahrb., Abt. Syst., XIII, p. 551.

[2] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, August 16, p. 171.

1913. *Panthera pardus chui* (Heller). (*Felis pardus chui* Heller.) Gondokoro, northern Uganda. (Smithsonian Misc. Coll., LXI, No. 19, p. 6.)
1917. *Panthera pardus centralis* (Lönnberg). (*Felis pardus centralis* Lönnberg.) Kabara, Lake Albert Edward. (Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, p. 49.)
1918. *Panthera pardus reichenowi* Cabrera. Yoko, Cameroon. (Bol. Soc. Esp. Hist. Nat., Madrid, XVIII, p. 481.)

Many early writers in describing the leopard, whether from Africa or Asia, referred in some detail to its variability in markings and general color tones, and also in size, with little or no information as to the exact geographical sources of their material, thus giving no clue as to whether these differentiations were merely individual or due to environment. Recent describers of what they assume to be regional forms have given detailed descriptions of their type specimens, placing great importance upon features, both cranial and external, which are within the normal range of purely individual variation. In fact, no large series of leopards from a single locality has been available for study until those collected by the American Museum Congo Expedition were received. These prove to be so widely variable in both size and coloration that alleged characters derived from single specimens are not necessarily to be taken as representing the norm of the localities where they were obtained. The character of a local form can only be established by examination of a large series of specimens, and its value determined only by their comparison with similar series from the type localities of neighboring forms, as *ruwenzorii* with *chui* and *centralis*, all described from the western border of Uganda, and all from localities with faunal affiliations with East Africa.

The material in hand (some fifty specimens) obtained by the American Museum Congo Expedition is separable into two series on geographical grounds, the one coming from the savannah or bush veldt district of northeastern Belgian Congo, the other from the Ituri Rain Forest district. The two series show an appreciable average difference, apparently in size as well as coloration. The first is believed to be referable to the form already described by Heller under the name *chui* from Gondokoro, a locality of similar environment and near the district where the bush veldt series was obtained. The other is recognized as subspecifically separable, for which no previous name appears to be applicable.

Both series show a wide range of individual color variation, which it seems desirable to present graphically by photographic illustrations, while tables of measurements serve to demonstrate variations in size, particularly of the skull and teeth.

Panthera pardus chui (Heller)

Plates XLI, Figures 1, 2; XLIV–LIV

Felis pardus chui Heller, 1913, Smithsonian Misc. Coll., LXI, No. 19, November 8, p. 6. Gondokoro, northern Uganda (type), and Rhino Camp, Lado Enclave (cotype).

Felis pardus chui Hollister, 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 170, 172-173. Same specimens.

Represented by 29 specimens (13 skins with skulls, 10 skins without skulls, 6 skulls without skins), nearly all adult, collected at the following localities:

Bafuka,[1] 1 (skin without skull), February 28, 1911.

Garamba, 3 (1 skin with skull and 2 separate skulls), July 20–22, 1912.

Faradje, 24 (12 skins with skulls, 8 skins without skulls, 4 skulls without skins), February 8–June 9, 1911; July 21–August 8, 1912; January 18–February 24, 1913.

Vankerckhovenville, 1 (skin without skull), March 1, 1911.

Collectors' measurements of 7 adult males and 1 adult female from Faradje; also 1 adult female from Garamba:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear[2]
♂	2155(2030–2420)	1252(1160–1398)	931(896–1022)	263(235–295)	85(84–86)
♀	1890	1110	780	235	73
♀	1850[3]	1085	765	220	—

The leopards of the Faradje district, like leopards everywhere, present a wide range of purely individual variation, as shown by the fourteen male examples from Faradje. The ground color of the upperparts[4] varies from pale buffy white to cinnamon-buff, usually of the latter type. The black markings vary in different specimens from well-defined rosettes to solid black spots, or form broken rings enclosing a slight touch or a well-developed spot of the ground color; often the rings are narrow, broken in front and usually laterally, by the ground color. The proportionate area of the black markings to the ground color varies from more than twice to less than one-half. The ground color of the ventral area is usually clear white but in some specimens shows a faint yellowish tone.

On the basis of single specimens at least five distinct types or styles of coloration can be selected which, if received from different localities, might easily be regarded as representing local or "regional" forms but which, taken with the rest of the series, can be considered as merely phases of individual differentiation. It is therefore evident that forms described from a single specimen may or may not fairly represent the average of their respective localities, with the chances strongly against such representation. It is hence evident that a supposed regional form, to have much taxonomic significance, must be supported by a considerable series of specimens instead of a single example, as has been often the case in the founding of subspecies in the leopard group. While an individual may not be able to "change his spots" his brothers and sisters and cousins may present very different patterns and tones of coloration, a fact it seems hard for describers to recognize, not alone in the case of leopards but in many other groups of mammals. The accompanying photographic illustrations (Pls. XLI, fig. 2 and XLIV–LIV) serve to show variations in pattern but of course fail to indicate beyond a slight degree the variations in color tones.

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[1] Sixty miles north of Niangara.

[2] Measurements of the ear include only four males and one female.

[3] From Garamba.

[4] The ground color is, of course, deepest over the mid-dorsal region, paling gradually toward the flanks.

The accompanying tables of cranial[1] and dental measurements (pp. 258–259) indicate a wide range in size. All the tabulated skulls are adult, ranging from young adults with the sutures only partly closed to the senile stage. In eight of the thirteen males the basal sutures are wholly obliterated, one (No. 52010) being in an advanced stage of senility. It is not, however, the largest of the series, the total length of the skull being 30 mm. below the maximum. The greatest length ranges, in male skulls with the basal sutures wholly obliterated, and all collected at Faradje, from 230 mm. to 282 mm. In five others from the same locality in which the basal sutures are wholly open or merely beginning to close, the total length ranges from 231 mm. to 247 mm. The variations in other dimensions are approximately coördinate, but present numerous discrepancies. Thus in old male skulls some of the transverse measurements are not proportionate to those of length in the same skull. In skull No. 52020, the greatest length is 282 mm., the mastoid breadth 108, and the least breadth of the mesopterygoid fossa 26.7; in No. 52017 the greatest length is 267 mm., the mastoid breadth 101.5, and the least breadth of the mesopterygoid fossa 28, the latter the maximum for the entire series of thirteen skulls. The length of the upper toothrow and the size of the carnassial are not always proportionate to the size of the skull.

It is of interest to note also that p^1 is present in one or both sides of the jaw in three of the Faradje skulls. In No. 52018 only the alveoli remain to indicate the presence of p^1 on both sides, the teeth having been lost in the preparation of the skull. In No. 52019 p^1 (about one-third of the size of p^2) is present on the right side and absent on the left, with no indication that it was ever present on the left. In No. 52020 p^1 is present on both sides, and about half as large as p^2, which is below normal in size.

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[1] Some authors give only one measurement for the length of the skull, which may be either greatest length, basal length, or condylobasal (=condyloincisive) length. For convenience of comparison with previous records, all three are here given.

The present series of twenty-four leopards from Faradje, three from Garamba, and one each from Bafuka and Vankerckhovenville, northeastern Belgian Congo, are provisionally referred to *Felis pardus chui* Heller, for the following reasons: They were all taken within about 100 to 150 miles east of the type locality (Gondokoro) of *chui* in similar environment; they agree in size with this form and, allowing for individual variation, also in coloration. The average cranial measurements of thirteen adult males are practically the same as the measurements of the type and topotype of *chui*, both old males, they varying only about 3 mm. in any of the principal dimensions (as tabulated by Hollister, *loc. cit.*, pp. 172, 173) from the average of the Faradje series. On the other hand, the average cranial measurements of six adult males of *Felis pardus suahelica* (as also tabulated by Hollister) from British East Africa are about 12 per cent smaller than the males of the Faradje series; while six adult females of *suahelica* are about 5 per cent smaller than the five females from Faradje and Garamba.

Other names that should be considered in this connection are *Felis pardus fortis* Heller, *Felis pardus ruwenzorii* Camerano, and *Felis pardus centralis* Lönnberg, each being based on a single specimen from, respectively, Loita Plains, British East Africa; Bujungolo, Ruwenzori; and Kabara, Lake Albert Edward.

F. p. fortis is described "as a large race which attains the maximum, the skull exceeding in length that of any other African or Asiatic race. The skull is further distinguishable by its narrowness, the small size of the tympanic bullæ and the absence of the first upper premolar. . . . Male skulls of *suahilica* [sic] differ in their much smaller size, the largest being seven-eighths of an inch less in length than the type of *fortis*. . . ." Reference to Hollister's tables of measurements shows the total skull length of *fortis* as 260 mm., and the corresponding measurement of the largest male skull of *suahelica* as 238 mm., or 22 mm. less. To show how little this difference may signify, it may be stated that the three largest old male skulls from Faradje have a total length, respectively, of 282, 279, and 267 mm., while three other adult male skulls of the same series, in which the sutures are wholly obliterated (except of course those of the nasals and the naso-maxillary-intermaxillary region which never disappear) have, respectively, the total length 252, 250, and 241 mm. These six skulls from Faradje represent the extremes of the series, with those of the interval between filling in the difference by slightly graduated stages. The type of *fortis*, however, is thus referred to by Hollister (*loc. cit.*, p. 175): "In size, color, skull, and dental characters this specimen differs widely from all other leopards in the collection. A case of very exceptional individual variation is here represented or else the animal belongs to a species quite distinct from the common leopard which is found in all the surrounding country." While disparaging the importance attributed by Heller to the dental peculiarities of the type, Hollister appears to accept the latter alternative, as he gives *fortis* the rank of a full species. On geographical grounds, however, *fortis* need not be further considered in the present connection.

Felis pardus ruwenzorii Camerano (1906) and *Felis pardus centralis* Lönnberg (1917) are both from localities faunally British East African in their relationships. Although *ruwenzorii* is elaborately described, the principal comparisons are made with the small pale form of the arid environment of Eritrea and Abyssinia, probably *Felis pardus nanopardus* Thomas. Its closest relationship is evidently with *Felis leopardus suahelicus* Neumann (1900) of British East Africa and northeastern German East Africa. The skull of the type specimen, a male, agrees in size with the average of adult males of *suahelica*. In view of the now known wide range of individual color variation in leopards, the elaborate description of the markings of the type have little significance, since other specimens from the type locality would most likely differ greatly from the type. It seems, therefore, necessary to leave *ruwenzorii* in abeyance pending further evidence regarding its status as a recognizable local form.

Felis pardus centralis is another case which may well be left for consideration till more evidence is available. Its type locality is very near that of *ruwenzorii*. Our knowledge of this form rests on the adult male type, although two other specimens in milk dentition from a near-by locality "must be supposed to belong to the same race" as the type.

Cranial Measurements of Seventeen Adults of *Panthera pardus chui* (8 old males, 4 old females, 5 young adult males) from Northeastern Belgian Congo

Cat. No.	Locality	Sex	Greatest Length	Condylobasal Length	Basal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Postorbital Constriction	Breadth Braincase	Mastoid Breadth	Breadth Mesopterygoid Fossa	Breadth across p^4-p^4	Length Nasals		Condition Basal Sutures
														Middle	Outside	
52020	Faradje	♂	282	246	233	168	65.6	48.0	44.0	89.3	108.2	26.7	88.4	65.4	82.3	Obliterated
52022	“	♂	279	243	228	165	64.2	47.6	47.7	82.0	104.5	26.7	88.2	64.8	85.7	“
52017	“	♂	267	239	224	153	58.2	45.2	43.3	79.3	101.5	28.0	——	67.8	79.3	“
52016	Garamba	♂	255	225	212	163	63.3	44.3	37.3	76.7	101.0	26.8	87.7	66.5	79.4	“
52040	“	♂	250	223	211	——	60.0	43.7	43.4	75.2	97.4	27.0	83.4	61.7	65.1	“
52010[1]	Faradje	♂	252	232	220	159	58.3	43.0	42.0	76.2	97.2	26.2	82.6	60.0	78.6	“
52008	“	♂	241	213	200	152	61.3	41.3	38.2	74.5	97.6	27.0	88.8	60.0	73.2	“
52013[2]	“	♂	230	213	201	144	55.1	37.4	38.5	71.8	90.5	24.3	78.1	57.2	66.4	“
Average		**7 ♂**	**261**	**232**	**218**	**160**	**61.6**	**44.7**	**42.3**	**79.0**	**101.0**	**26.9**	**86.6**	**63.5**	**77.7**	
52005	Faradje	♀	203	185	172	127	48.0	34.6	38.7	69.7	82.9	21.6	72.6	50.2	63.2	Obliterated
52009	“	♀	201	184	173	125	49.3	37.6	41.2	70.0	81.8	23.4	75.5	51.0	62.1	“
52024	“	♀	197	179	167	128	51.5	32.7	41.3	72.3	83.7	22.0	75.0	50.2	61.2	“
52039	Garamba	♀	195	179	167	122	46.2	34.4	38.1	70.4	74.9	22.8	68.8	45.4	58.8	“
Average		**4 ♀**	**199**	**182**	**170**	**126**	**48.8**	**34.8**	**39.8**	**70.6**	**80.8**	**22.5**	**72.9**	**49.2**	**61.3**	“
52004	Faradje	♂	247	215	201	142	59.9	40.3	41.3	75.5	99.6	27.4	82.6	64.2	77.4	Open
52012	“	♂	240	214	201	140	56.5	38.5	41.4	71.5	95.0	26.6	82.0	56.8	71.2	“
52023	“	♂	234	207	191	142	56.1	37.8	38.9	77.1	99.3	26.3	83.6	59.1	72.3	“
52006	“	♂	231	207	192	141	55.8	37.5	38.4	75.1	94.4	24.9	79.5	57.1	71.0	“
52018[3]	“	♂	231	210	194	135	54.1	40.6	43.6	72.0	95.0	24.6	83.6	61.9	73.7	“
Average		**5 ♂**	**237**	**211**	**196**	**140**	**56.5**	**38.9**	**40.7**	**74.2**	**96.7**	**26.0**	**82.3**	**59.8**	**73.1**	

[1] Senile; oldest of the series.
[2] This is a dwarf and is exlcuded from the averages.
[3] Youngest of the series.

Dental Measurements of Seventeen Adults of *Panthera pardus chui* from Northeastern Belgian Congo

Cat. No.	Locality	Sex	Upper Toothrow c-p^4	Lower Toothrow c-m_1	Upper Canine, length at alv. border	p^2-p^4	p_3-m_1	$p^3 + p^4$	Upper Carnassial	Length m_1	Condition Basal Sutures
52020	Faradje	♂	83.1	84.5	20.4	54.3	53.7	49.3	26.7×14.4	20.3	Obliterated
52022	"	♂	79.7	91.4	18.9	52.7	53.2	45.0	26.4×13.8	20.3	"
52017	"	♂	80.9	——	18.5	53.4	54.3	47.8	27.8×14.1	20.0	"
52016	Garamba	♂	74.9	87.7	19.7	50.9	53.1	44.0	25.1×13.7	20.0	"
52040	"	♂	78.2	87.4	17.3	54.8	49.2	46.4	27.5×13.6	19.1	"
52010	Faradje	♂	75.2	85.2	18.3	51.9	49.1	42.0	25.3×12.3	19.1	"
52004	"	♂	74.1	87.3	17.8	50.6	52.1	42.8	24.8×13.8	19.1	Open
52008	"	♂	75.5	85.6	16.9	42.5	47.7	42.5	24.7×13.5	18.2	Closed
52012	"	♂	72.3	82.4	17.2	50.2	50.3	42.3	24.2×13.3	18.7	Open
52023	"	♂	72.5	82.7	16.4	51.7	47.2	41.7	23.8×12.5	18.3	"
52013	"	♂	73.0	84.0	19.7	49.5	46.2	40.2	24.4×12.6	18.0	Closed
52006	"	♂	72.0	83.6	16.6	50.2	49.6	43.5	25.9×12.7	19.0	Open
52018	"	♂	74.6	81.0	15.7	50.7	47.8	43.6	25.3×12.6	18.5	"
Average		**13** ♂	**75.8**	**85.2**	**17.9**	**51.0**	**50.3**	**43.9**	**25.5×13.3**	**19.1**	
52005	Faradje	♀	66.0	73.4	13.4	46.2	——	40.2	23.9×11.6	17.3	Obliterated
52009	"	♀	64.5	73.0	13.8	45.0	43.5	39.6	23.5×11.4	16.5	"
52024	"	♀	65.0	72.8	13.7	46.8	43.8	40.2	24.8×12.3	17.8	"
52039	Garamba	♀	62.0	71.8	12.8	44.8	42.7	38.3	23.0×10.7	16.0	"
Average		**4** ♀	**64.4**	**72.8**	**13.4**	**45.7**	**43.3**	**39.6**	**23.8×11.5**	**16.9**	

Panthera pardus iturensis, new subspecies

Plates XLI, Figure 3; LV–LXIV

Type, No. 52025, ♂ adult, Niapu, Belgian Congo, November 24, 1913; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 2049.

Similar to *Panthera pardus chui* but smaller and darker in general coloration, pelage shorter and thinner.

Collectors' measurements of type: Total length, 2120 mm.; head and body, 1285; tail vertebræ, 835; hind foot, 245; ear, 75.

Skull (type): Greatest length, 255; condylobasal length, 232; basal length, 215; zygomatic breadth, 158; breadth at base of canines, 63.8; postorbital constriction, 42.3; mastoid breadth, 102; breadth across p^4-p^4, 84.6. The type specimen is the largest and oldest of the series but is much smaller than corresponding skulls of the *chui* series, as is shown by the tabulated measurements of the *chui* and *iturensis* series (cf. pp. 258, 262).

Represented by 20 specimens (16 skins with skulls, 1 skin without skull, 3 skulls without skins), collected as follows:

Poko, 2 (skulls only), August 7, 1913.

Akenge, 6 (skins with skulls, 4 immature), September 16–October 22, 1913.

Niapu, 7 (6 skins with skulls—3 immature, 1 skin without skull), November 24, December 16–31, 1913; January 8, February 11, 1914.

Medje, 3 (3 skins with skulls, 2 immature), August 10, 1910; March 26 and June 4, 1914

Gamangui, 2 (1 skin and 2 skulls), February 6, 1910

Collectors' measurements of 3 adult males and 1 adult female:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
♂	1970(1790–2120)	1155(1025–1285)	800(765–835)	242(220–260)	72(70–75)
♀	1690	910	780	205	65

Panthera pardus iturensis is intermediate in cranial measurements between *P. p. suahelica* (on the basis of Hollister's measurements, *loc. cit.*, p. 172) and *P. p. chui* (on the basis of Faradje and Garamba specimens), the average greatest length of five old male skulls of *suahelica* being 226 mm., of five similar skulls of *iturensis* 239 mm., and of seven similar skulls of *chui* from the Faradje district 261 mm. Larger series might change this ratio but probably not materially.

The same amount and kind of individual variation in the size and form of the markings and in the tone of the ground color occurs in *iturensis* (Pls. XLI, fig. 3 and LV–LXIV) as has been indicated above for *chui*, and is also present in *suahelica*, but the coloration averages much darker and the pelage is distinctly shorter and thinner than in *chui* or *suahelica*, in conformity with the differing environments of the three forms.

The type locality of *Panthera pardus leopardus* (Schreber), as already shown (*antea*, p. 250), is Senegal, and hence not only far remote from the Ituri Rain Forest region but in a very different environment. There is no material available from Senegal for comparison with the present series, but geographic considerations seem to render it unnecessary to discuss in detail the relationship of *leopardus* to the present form.

The recently described *Panthera pardus reichenowi* Cabrera[1] is in a different category. The type, a skin and skull, from Yoko, Cameroon, is fully adult, and believed by the author to be a male. If the skull and skin belong to the same animal, there is a strange discrepancy between the size of the skull and the dimensions of the skin; the skull, as shown by Cabrera's measurements, is of the size of an average female skull of the West African leopards as represented in the Gaboon and in the Ituri Forest, while the measurements given of the skin (head and body 1260 mm.[2]) equal the average measurements of fully adult males in the present Congo series. It is my firm conviction that the skull is that of a female, for which evidence is given below. The author says of the skin (*loc. cit.*, p. 482): "En la piel no se observa indicio ninguno de las mamas, y en cambio parece haber bajo la raiz de la cola algún residuo de escroto."

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[1] 1918, Bol. Soc. Española Hist. Nat., Madrid, XVIII, December, p. 481.

[2] "Cabeza y cuerpo, 126 mm. [probably an error for 126 cm.]; cola, 78; pie posterior, 16." The latter must be a lapsus or typographical error for 26 cm., as 260 mm. is about the average length of the hind foot in the adult male leopards from the Upper Congo, and about 250 mm. for the smaller *P. p. suahelica* of East Africa.

Cabrera gives a table of measurements of three skulls referred by him to *reichenowi* and of five skulls identified by him as those of *leopardus*, in part from Pocock's paper 'On the Skulls of Leopards.'[1] The two tables in combination afford measurements of four skulls from Cette Cama, Gaboon, and four from the coast of Guinea, making eight in addition to the type of *reichenowi* from Cameroon. The sex is not given positively for any of them. Pocock's smallest of his four skulls from Cette Cama he indicates as "♀?", and is referred by Cabrera to *reichenowi*. The literature shows that from the beginning of the history of leopards there has been a belief, particularly among travelers and sportsmen, that two kinds of leopards, a large one and a small one, occur together in many localities. Pocock, in referring to the small Cette Cama specimen, says: "This skull lends support to the oft-repeated statements of sportsmen that two kinds of Leopards, larger ones called Panthers and smaller ones called Leopards, occur in the same localities." Two of the three large ones recorded by Pocock are from the same locality as *leopardus*. The largest of Pocock's Cette Cama leopard skulls (total length 282 mm.) just equals the size of the largest male leopard skull from Faradje, these two being the largest leopard skulls thus far recorded. Evidently two kinds of leopards do occur at the same localities, a large one and a small one; the large one, so far as authentic records of adults show, is male, and the small one as invariably female. The supposed male type skull of *reichenowi* agrees in measurements with four skulls known to be females from the Ituri Forest, but is slightly smaller than known female skulls from Faradje. The average total length of the three skulls tabulated by Cabrera as *reichenowi* varies but one millimeter from the average of four female skulls from the Ituri Forest. On the other hand, the three larger skulls of the four from Cette Cama of which Pocock gives measurements average 274 mm. in total length, as against 276 mm. for the three largest male skulls of the Faradje series. Cabrera gives the length of head and body of the type skin of *reichenowi* as "126 mm." (doubtless a misprint for 126 cm.); the flesh measurements of

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[1] 1909, Proc. Zoöl. Soc. London, pp. 204, 209, Figs. 22, 23.

Cranial Measurements of Ten Adults of *Panthera pardus iturensis*

Cat. No.	Locality	Sex	Greatest Length	Condylobasal Length	Basal Length	Zygomatic Breadth	Breadth at Base Canines	Interorbital Constriction	Postorbital Constriction	Breadth Braincase	Mastoid Breadth	Breadth Mesopterygoid Fossa	Breadth across p^4-p^4	Length Nasals		Condition Basal Sutures
														Middle	Outside	
52025[1]	Niapu	♂	255	232	215	158	63.8	43.3	42.3	77.0	102.0	26.7	84.6	67.0	78.5	Obliterated
52044	Gamangui	♂	250	227	212	150	59.8	42.7	43.4	79.3	95.6	26.8	85.7	63.0	73.1	"
52042	Poko	♂	246	—	—	161	61.2	40.8	40.6	76.4	99.1	26.8	86.0	57.8	73.2	"
52032	Medje	♂	220	191	—	—	54.6	39.1	41.0	—	—	—	80.0	52.0	67 5	"
52043	Gamangui	♂	225	204	201	138	55.2	35.6	37.0	75.0	93.6	27.2	82.5	—	—	Open
Average		**5 ♂**	**239**	**214**	**207**	**152**	**58.9**	**40.3**	**40 9**	**76.9**	**97 6**	**26.9**	**83.8**	**59 9**	**73.1**	
52041	Poko	♀	193	170	159	119	45.0	30.6	39.0	65.6	76.2	22.0	70.0	45.3	57.8	Obliterated
52033	Akenge	♀	191	171	159	124	46.3	31 2	40.6	72.5	76.8	23.2	71.9	42.2	52.8	"
52035	"	♀	176	161	150	115	43.8	28.4	41.4	66.0	—	20.0	69.8	43.2	53.5	"
52030	Niapu	♀	186	162	152	124	45.8	32 1	42.2	70.0	77.9	21.8	67.7	44.7	55.7	"
52026	"	♀	185	168	158	—	44.0	29 3	38.7	72.4	77.7	22.1	70.0	46.4	55.0	"
Average		**5 ♀**	**186**	**166**	**155**	**121**	**45.0**	**30.3**	**40.4**	**69.3**	**77.2**	**21 8**	**69 9**	**44.4**	**55 0**	

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[1] Type.

head and body for seven adult males from Faradje average 1252 mm. Hence the opinion expressed above that the type skull and type skin of *reichenowi* came from different animals, the skull from a female, the skin (provisionally identified as male) from a male. Obviously further evidence is necessary before *reichenowi* can be considered as a satisfactorily established subspecies.

Dental Measurements of Ten Old Specimens of *Panthera pardus iturensis*

Cat. No.	Locality	Sex	Upper Toothrow $c-p^4$ (inclusive)	Lower Toothrow $c-m_1$	Upper Canine, length at alv. border	p^2-p^4	p_3-m_1	p^1+p^4	Upper Carnassial	Length of m_1	Condition Basal Sutures
52025[1]	Niapu	♂	79.0	88.7	20.8	52.7	51.9	45.5	26.6×14.8	19.8	Obliterated
52044	Gamangui	♂	80.5	89.3	19.0	54.0	49.7	47.0	27.2×14.2	20.2	"
52042	Poko	♂	76.4	86.4	19.0	52.4	50.6	45.4	26.6×14.9	19.4	"
52032	Medje	♂	70.5	79.4	16.5	41.5	51.6	42.6	24.6×13.4	18.6	"
52043	Gamangui	♂	70.4	84.5	16.3	51.4	49.2	44.0	26.2×14.1	17.9	Open
Average		**5♂**	**75.4**	**85.7**	**18.3**	**50.4**	**50.6**	**44.9**	**26.2×14.3**	**19.2**	
52041	Poko	♀	62.0	67.5	12.3	40.0	40.8	37.3	22.2×12.0	15.0	Obliterated
52033	Akenge	♀	61.5	66.1	11.8	40.0	41.7	39.7	24.3×11.9	16.2	"
52035	"	♀	56.9	63.0	12.3	39.3	38.3	36.2	22.7×11.0	16.2	"
52030	Niapu	♀	58.2	68.9	13.6	42.1	41.1	34.5	22.5×11.3	16.0	"
52026	"	♀	59.8	66.1	13.2	45.3	43.0	39.0	23.2×11.4	17.0	"
Average		**5♀**	**59.7**	**66.3**	**12.6**	**41.3**	**41.0**	**37.3**	**23.0×11.5**	**16.1**	

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[1] Type

Comparative Summary of Cranial and Dental Measurements of *Panthera pardus chui*, *P. p. iturensis*, *P. p. suahelica*, and *P. p. fortis*[1]

	Sex	No. of Specimens		Greatest Length	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Breadth at Base Canines	Upper Toothrow (c-p^4)	Upper Carnassial
chui	♂	7	Average	261	232	160	101.0	61.6	76.8	26.2×13.9
iturensis	♂	5	"	239	214	152	97.6	58.9	75.4	26.2×14.3
suahelica	♂	5	"	226	203	152	90.0	56.0	70.5	25.0×12.9
fortis	♂	1	"	260	236	157	104.0	64.0	81.0	26.8×15.4
chui	♂	7	Minimum	241	213	152	97.2	58.2	74.9	25.1×12.3
iturensis	♂	5	"	220	191	—	93.6	54.6	70.4	24.6×13.4
suahelica	♂	5	"	218	200	138	85.0	50.0	67.0	24.6×12.6
chui	♂	7	Maximum	282	246	168	108.2	65.6	83.1	27.8×13.5
iturensis	♂	5	"	255	232	161	102.0	63.8	80.5	27.2×14.9
suahelica	♂	5	"	238	217	150	95.0	58.0	74.0	26.0×13.6
chui	♀	4	Average	199	182	126	80.8	48.8	61.4	23.8×11.5
iturensis	♀	5	"	186	166	121	77.2	45.0	59.7	23.0×11.5
suahelica	♀	6	"	192	175	121	75.7	46.2	63.6	22.7×11.5
chui	♀	4	Minimum	195	179	122	74.9	46.2	62.0	23.0×10.7
iturensis	♀	5	"	176	161	115	76.2	43.8	56.9	22.5×11.0
suahelica	♀	6	"	182	167	110	72.0	46.7	59.0	21.5×11.1
chui	♀	4	Maximum	203	185	128	83.7	51.5	66.0	21.8×12.3
iturensis	♀	5	"	193	170	124	77.9	46.3	62.0	24.3×12.0
suahelica	♀	6	"	198	180	126	79.0	50.0	63.0	24.3×12.7

LEPTAILURUS Severtzow

Leptailurus (subgenus of *Felis*) SEVERTZOW, 1858, Rev. Mag. Zool., (2) X, September, pp. 389, 390. Type, by monotypy, *Felis serval* Schreber.

Leptailurus POCOCK, 1917, Ann. Mag. Nat. Hist., (8) XX, November, pp. 337, 349. Same type, Allen, 1919, Bull. Amer. Mus. Nat. Hist., XLI, September 22, p. 338.

"*Galeopardus* Heugl." FITZINGER, 1866, Sitzungsb. Ak. Wiss. Wien, LIV, Abth. 1, p. 557. Type, by monotypy, *Felis serval* Schreber.

Serval (subgenus of *Felis*) GRAY, 1867, Proc. Zoöl. Soc. London, p. 272. Type, by tautonymy, *Felis serval* Schreber.

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[1] The specimens are all perfectly comparable in respect to age, the basal (sphenoidal) sutures in all the skulls having become obliterated through complete ankylosis.

The genus *Leptailurus* comprises two species, each represented by several regional forms. Its distribution includes the greater part of Africa south of the Sahara.

In 1907 Pocock[1] held the opinion that the servals were separable into two species, *Felis serval* and *F. servalina*, on the basis of the diverse styles of color markings characterizing respectively the serval and the servaline cats, and submitted evidence in support of this view. In 1917, however, in his paper on 'The Classification of existing Felidæ,'[2] he said, under the genus *Lèptailurus* (*loc. cit.*, p. 337): "One species only, with several local races," to which he added in a footnote the following: "Two species have been admitted, namely, *serval* and *servalina*. These, however, are now known to be merely varieties, the species being dimorphic in pattern (P. Z. S. 1915, i, p. 154), the two types of pattern symbolized by the names being found in the same litter." Twenty specimens collected at Faradje by the American Museum Congo Expedition represent both types. As this large series gives no indication of intergradation, I turned to the reference given by Pocock for the details of what seemed a startling discovery, and found the following, here transcribed in full: "Mr. Guy Aylmer, F. Z. S., exhibited some skins of mammals from Sierra Leone, including those of a Serval (*Felis capensis*) and of a Servaline Cat (*F. servalina*), and stated that a native had brought him two kittens, almost certainly from the same litter, one being spotted like the Serval and the other obscurely speckled like the Servaline Cat. This he regarded as proof that the differences between the Servals and Servaline Cats are of no systematic importance." To me Mr. Aylmer's statement is not evidence but merely the supposition of a native that the two young cats in question were "almost certainly from the same litter"! Further comment on this astonishing discovery seems unnecessary until it has been confirmed by unquestionable evidence.

It may be recalled, however, that Pocock in his paper 'On English Domestic Cats,' published in 1907,[3] in discussing color and color patterns in breeds of domestic cats, said (*loc. cit.*, pp. 145–146): "On the other hand, notwithstanding individual and local variations, the pattern formed by spots or stripes in existing species of *Felis* is on the whole constant. . . . *Nor, so far as I am aware, is there any reason to suppose that dimorphism in pattern ever occurs or has ever occurred in any species of the genus* Felis."[4] This strong statement accords with my own experience in respect to dimorphism in mammals, where pattern remains while color may become radically changed, as in melanism, in erythrism, and in partial albinism.

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[1] 1907, Proc. Zoöl. Soc. London, II, pp. 656–677, Pl. xxxviii, Figs. 175–178.
[2] 1917, Ann. Mag. Nat. Hist., (8) XX, November, pp. 329–350.
[3] 1907, Proc. Zoöl. Soc. London, I, pp. 143–168, Pls. viii–x, and Fig. 60.
[4] Italicized in the original.

Note on *Felis serval* Schreber

Felis serval Schreber[1] was based primarily on Buffon and Daubenton's 'Le Serval,' Schreber's plate of *Felis serval* being an excellent and acknowledged copy of Buffon's (1765, 'Hist. Nat.,' XIII, Pl. xxxiv), colored from the Buffon-Daubenton description (*loc. cit.*, pp. 233-238). Schreber's plate (Pl. cviii) was published so much in advance of the text of Theil III of the 'Säugthiere' that it was available for citation by Erxleben in his 'Systema Regni Animalis' (p. 523), published under the date of 1777, whose *Felis serval* is based essentially on Buffon and Daubenton's plate and Schreber's copy of it, his various subsidiary references being technically indeterminate and consequently non-pertinent, including Perrault's Chat-Pard,[2] from which Daubenton (*loc. cit.*) took his measurements of Le Serval and also his anatomical observations.

The basis of Buffon and Daubenton's account of Le Serval was a living animal that was kept for some years in the Royal Menagerie at Versailles, under the name Chat-tigre, but being too ferocious to be handled was described and figured as seen through the bars of its cage. It was from an unknown source but supposed to be the animal known to the Portuguese in India as Serval.[3] This surmise is obviously the basis of Schreber's assignment of it to the mountainous regions of the East Indies and Tibet, and of Erxleben's "Habitat in silvis montosis Indiæ, in arboribus degens." Schreber, on the basis of Kolbe, adds, "vielleicht auch am Vorgebirge der guten Hofnung." It is admitted, even by authors who would discard Schreber's *Felis serval* for a later name, that Buffon and Daubenton's Le Serval is identifiable beyond doubt with the Tiger-cat of Cape Good Hope, later redescribed and figured by Forster as *Felis capensis*. As Buffon says that it seemed to him that the serval of "Malabar & des Indes" is the same animal as "le chat-tigre du Sénégal & du cap de Bonne-espérance," quoting Kolbe as his authority for the Cape of Good Hope reference, it seems reasonable to assume the Cape region of South Africa as the type locality of *Felis serval* Schreber.

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[1] 1776, 'Säugthiere,' Pl. cviii; *op. cit.*, 1777, Theil III, p. 407.

[2] Perrault, 1733, 'Mém. Hist. Nat. Animaux,' Mem. Ac Sci., Paris, for 1666-1669, III, pt. 1, pp. 108–116, Pl. xiii (animal), Pl. xiv (anatomy).

[3] "*Serval*, nom que les Portugais habitués dans l'Inde, ont donné à cet animal" (Buffon, *loc. cit.*, p. 233, footnote).

Felis capensis Forster, as we know from his own account,[1] was described and drawn from a wounded animal brought alive in a basket to his apartment at Capetown, which, he states, was thought to be about eight or nine months old and "had already very nearly, if not quite, attained its full growth." It had been taken when quite young, and its kind was said to live "in mountainous and woody tracts" in the interior. It seems therefore best, in the interest of nomenclature, to consider *Felis capensis* Forster (1781) a synonym of *Felis serval* Schreber (1776) and Erxleben (1777).

Leptailurus serval faradjius, new subspecies

Plates LXV–LXX; LXXIV, Figure 1

Type, No. 51990, ♂ adult, skin and skull, Faradje, northeastern Belgian Congo, November 26, 1912; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. 1170. (Pls. LXV and LXVI.)

In ground color and markings intermediate between the rich rufo-fulvous forms of the West African coast regions and the pale forms of the Sudan and British East Africa. General tone above ochraceous buff, varying but little in a considerable series of specimens; black markings sharply defined, of medium size, the dorsal lines narrow, the body spots about twice as long as wide, becoming broader and shorter on the shoulders and thighs; underparts and inside of limbs white, the former with small, the latter with large spots of black; tail irregularly blotched and ringed with black basally, the apical third or half with well-defined annulations of black (Pls. LXVII–LXVIII).

Size and cranial characters not distinctive, but apparently somewhat smaller than *L. serval hindei* of British East Africa.

Collectors' measurements of type: Total length, 1102 mm.; head and body, 847; tail vertebræ, 265; hind foot, 180; ear, 82.

Skull (type): Greatest length, 120.0; condylobasal length, 107.7; basal length, 101.0; zygomatic breadth, 81.2; least interorbital breadth, 20.8; postorbital constriction, 29.8; mastoid breadth, 48.0; breadth across p^4-p^4, 46.7; breadth of braincase, 49.8; length of upper cheek-teeth (c-m^1), 37.6; length of p^4, 13.7. (For skull of type, see Pls. LXIX and LXX.)

Compared with skulls of *hindei* from British East Africa, the condylobasal length is 10 mm. less, and the zygomatic breadth 6 to 10 mm. less.

Represented by 16 specimens, mostly immature, about one-half of them skins without skulls (in part native-made) collected as follows:

Niangara, 2 (♂ and ♀, both young), November 14, 1910.

Faradje, 14 (7 adult, 7 immature), February 18–November 26, 1911; January 6–June 19, August 13, October 21–29, November 26, December 3, 1912.

Nine of the sixteen specimens are young, ranging in age from four nurslings in first pelage and one in which the milk dentition is fully developed to others half to two-thirds grown. The seven adults include three skins with skulls, of which one is a deep black melano with the normal color pattern barely distinguishable; the other four adults are native-made skins without skulls.

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[1] Forster, John Reinhold, 1781, 'Natural History and Description of the Tyger-cat of the Cape of Good Hope.' Philos. Trans. Roy. Soc. London, LXXI, pt. 1, pp. 4–6, Pl. i (animal).

The only material available for direct comparison with the present series consists of five examples of *L. serval kempi* (Wroughton) the nearest geographical form of this group (Pl. LXXI). These differ from the Congo specimens in the strikingly paler tone of the ground color, coarser markings, and somewhat larger size, although in this respect the difference is not strongly marked.[1] The type localities of the subspecies of *Leptailurus serval* are all so remote from Faradje that geographical considerations imply the probability of the Congo series belonging to a different and thus far unnamed regional form.

The young in first pelage differ greatly from adults in coloration. The first coat is long and soft, wholly unspotted on the upperparts and very indistinctly spotted on the ventral surface. The sides of the body are uniform brown, varying in different specimens from pale sandy brown to dark brown; the median dorsal area, from nape to the base of the tail, forms a broad blackish brown band, spreading laterally on the nape to the base of the ears; the ears are intense black externally with a whitish cross-bar, and distinctly black-tufted, the inside heavily clothed with long white or yellowish white hairs. The facial pattern is as in adults but less sharply defined. Chin, pectoral and inguinal areas and inside of limbs whitish; foreneck faintly buffy; inside of limbs with indistinct blackish blotches, and there are indistinct dusky rings on the tail. In the youngest of the series, in which the teeth have not pierced the gums (total external length about 340 mm., greatest length of skull 50, breadth of braincase 30), the whole body, below as well as above, is unspotted, but dark bands of very short hair are forming on the inside of the limbs. In three others, still in the first woolly coat, the lower throat, pectoral and ventral areas, sides of body and inside of limbs show slight dusky spots, due to the incoming of short black hairs, without further change in the general coloration. In an older specimen, with the milk teeth breaking through or partly developed (total length 360 mm., greatest length of skull 58, breadth of braincase 47) the first coat has been wholly replaced and the color tones and markings are the same as in adults, showing that the change is completed as soon as the second pelage has fully replaced the natal dress.

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[1] Two of the Congo specimens have also been compared in respect to size with the measurements given by Wroughton (1910, Ann. Mag. Nat Hist., (8) V, pp. 205, 206) of the types of his *Felis capensis hindei*, *F. c. kempi* and *F. c. beiræ*, and by Hollister (1918, U. S. Nat. Mus. Bull. 99, pt. 1, p. 177, eight specimens), and with five specimens in this Museum from the type region of *kempi*.

The described forms of the *Leptailurus serval* group are:

1776. *Felis serval* Schreber, 1776, 'Säugthiere,' Pl. CVIII; *op. cit.*, 1777, Theil III, p. 407. Cape region of South Africa. (*Supra*, p. 266.)

1781. *Felis capensis* Forster, Philos. Trans. Roy. Soc. London, LXXI, pt. 1, pp. 4–6, Pl. I. Near Capetown, South Africa. = *Felis serval* Schreber. (*Supra*, pp. 266-267.)

1820. *Felis galeopardus* Desmarest, 'Mamm.,' I, p. 227. Based on Le Serval of F. Cuvier, from an unknown locality. Unidentifiable. (*Infra*, p. 269.)

1839. *Felis senegalensis* Lesson, 'Mag. de Zool.,' Mamm., Pl. x, and accompanying text. "Les bords du fleuve Sénégal." Name preoccupied by *Felis senegalensis* Meyer (1826) for the Senegal lion. Replaced by Cabrera (1910, Bol. Soc. Española Hist. Nat., Madrid, X, pp. 426–427) by *Felis serval pococki* nom. nov. (*Infra*, p. 269.)

1893. *Felis (Serval) togoensis* Matschie, Sitzungsb. Ges. Naturf. Freunde Berlin, No. 3, März, p. 109. Bismarckburg, Togo, West Africa.

1898. *Felis (Serval) togoensis niger* Lönnberg, Zool. Jahrb. Abt. Syst., X, p. 571. Name preoccupied by *Felis nigra* Erxleben; replaced by *Felis serval lonnbergi* Cabrera, *loc. cit.*, p. 427.

1910. *Felis capensis hindei* Wroughton, Ann. Mag. Nat. Hist., (8) V, February, p. 205. Machakos, British East Africa.

1910. *Felis capensis kempi* Wroughton, idem, p. 206. Kirui, Mount Elgon, British East Africa.

1910. *Felis capensis beiræ* Wroughton, idem, p. 206. Beira, Portuguese East Africa.

1914. *Felis capensis phillipsi* G. M. Allen, Bull. Mus. Comp. Zoöl., Cambridge, Mass., LVIII, No. 7, July, p. 337. El Garef, Blue Nile, Sudan

1920. *Felis serval kivuensis* Lönnberg, Rev. Zool. Africaine, VII, fasc. 3, p. 242. "Kivu district."

Note on *Felis galeopardus* Desmarest

Felis galeopardus Desmarest (1820, 'Mamm.,' I, p. 227) has been given precedence by some authors over *Felis senegalensis* Lesson (1839) without good reason, for *Felis galeopardus* is unidentifiable, its sole basis being "Le Serval" of F. Cuvier (1818, 'Hist. Nat. Mamm.,' I, livr. 1, December), the geographical source of the living specimen on which it was based being unknown. Desmarest himself says, "Habit. Inconnues"; and F. Cuvier says: "Le Serval que nous avons possédé était un jeune mâle, remarquable par sa douceur et sa gentillesse; . . . . Il était arrivé par un bâtiment à Brest, mais celui qui en avait fait l'acquisition avait négligé de s'informer dans quelle partie du monde il avait été pris." The description and figure of Cuvier's Le Serval are in strong contrast with Lesson's description and figure of *Felis senegalensis*, the former having the ground color very pale and the markings sparse and small, while the latter has the ground color deep (rufo-fulvous) and the markings heavy and coarse. Therefore, to substitute *galeopardus* for *senegalensis*, simply because it has priority, as was done by Matschie in 1893 (*loc. cit.*) and by Wroughton in 1910 (*loc. cit.*) is wholly indefensible. *Felis galeopardus* Desmarest is indeterminate and therefore unavailable.[1]

Leptailurus ogilbyi[2] **pantasticta** (Pocock)

Plates LXXII, LXXIII

[*Felis servalina*] *pantasticta* Pocock, 1907, Proc. Zoöl. Soc. London, II. pp. 665, 666, Pl. xxxviii, fig. 3. Entebbe, Uganda.

[*Felis servalina*] *poliotricha* Pocock, idem. Monbuttu (=Niangara, Belgian Congo).

Represented by seven specimens, all from Faradje, and all but one native-made skins, without skulls. The single made-up skin (No. 51984) is without field measurements but has a good skull. It is a youngish adult female, with most of the cranial sutures open, but has the sagittal and lambdoid crests quite strongly developed. The skull measures: Greatest length, 114.4 mm.; condylobasal length, 109.2; basal length, 102.8; zygomatic breadth, 82.5; interorbital breadth, 23.5; postorbital constriction, 33.0; breadth of braincase, 58.7; length of upper toothrow (c-m), 36.3; length of p^4 on outer side, 13.8.

The general style of markings is quite uniform throughout the series, although in some specimens they are a little finer than in others, and the tone of the ground color is also a little lighter, yet the range of variation is quite limited, in comparison with individual variation in other forms of spotted cats. The extremes of variation are shown on Pls. LXXII and LXXIII, in comparison with the extremes of the series of the *serval* type from the same locality (Pls. LXVII–LXVIII).

In the Congo series of these two types there is no intergradation in the strikingly different patterns of markings. As the servaline type is represented by seven specimens, and the serval type by ten, all comparable as to sex, age and season, and all from the same locality, this constancy of coloration seems to fully confirm Pocock's opinion expressed in 1907[3] that *Felis serval* and *F. servalina* (=*ogilbyi*) should be regarded as fully segregated species and not dichromatic variants of a single species. Their ranges, while overlapping to a considerable extent, are far from being identical. So far as available records go, it is evident that the range of the serval group extends over practically the whole of Africa south of the Sahara, while the servaline group appears to be unrecorded from the greater part of South Africa and British East Africa, regions where the serval is of well-known occurrence. In addition to the eight specimens of the serval type in the United States National Museum (which I have seen), are five collected by the Tjader and Rainsford Expeditions of this Museum, all of which represent the *hindei* type.

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[1] Since writing the above I have found that Pocock in 1907 (Proc. Zool. Soc. London, II, p. 667) had reached the same conclusion. It seems worth while, perhaps, to let the above stand as an independent confirmation of his contention of twelve years ago, especially as Wroughton has since (in 1910) expressed an opposite opinion.

As noted above (p. 269) there is an earlier *Felis senegalensis* Meyer, given to the Senegal lion in 1826, which invalidates the name *Felis senegalensis* Lesson, but this has no bearing on the case of *Felis galeopardus* Desmarest as an alternative name for *Felis senegalensis* Lesson, which has been appropriately replaced by *pococki*.

[2] Cabrera has shown (1910, Bol. Soc. Española Hist. Nat. Madrid, X, p. 426) that the name *Felis servalina* Ogilby (1839) is preoccupied by *Felis servalina* Jardine (1834, 'Nat. Hist. Felinæ,' p. 272) for an Indian species, and has replaced Ogilby's name with *Felis ogilbyi* Schinz (1844, 'Synop. Mamm.,' I, p. 469), a substitute name for Ogilby's *Felis servalina*.

[3] 1907, Proc. Zool. Soc. London, II, pp. 662–666, Pl. xxxviii.

The specimens of the serval and servaline types from Faradje and Niangara throw much light on questions raised by Pocock in 1907 regarding the relationships and distribution of these interesting and little-known groups of cats. As stated by him in his general review of the case (*loc. cit.*, p. 663), the only difference apparent between the two groups is the striking difference in their respective patterns of markings. He concludes that the available evidence seems "in favor of regarding *F. servalina* as a valid species." Referring to its known distribution, he says it "appears to coincide very closely with that of many West African animals like the Chimpanzee, *Felis aurata* and others." In the British Museum, he says, there are skins from Senegal, Sierra Leone, Monbuttu and Entebbe, and various points near and in Angola. "These localities," he adds, "suggest that *F. servalina* occurs on the fringe of the West African forest-region. How far it extends into the heart of that area is a matter for conjecture. . . .That *F. serval* and *F. servalina* have been recorded from the same country is indisputable; but, so far as I am aware, there is as yet no convincing evidence that the two forms are found side by side on the same spot. . . .This is clearly a question about which more evidence is required before a correct opinion can with certainty be arrived at; but as a working hypothesis it may be assumed that *F. servalina* inhabits the triangular area, or at all events the fringe of that area, whose angles are situated, broadly speaking, at Sierra Leone, Angola, and Uganda; and that the Serval is distributed in the countries lying to the north, east, and south of that area."

Pocock closes his discussion with diagnoses of four subspecies of the servaline group, of which three are proposed as new. These four forms, with their type localities, are:

1. Subspecies *servalina* Ogilby; type locality, Sierra Leone.
2. " *pantasticta*, nov.; Entebbe, Uganda.
3. " *poliotricha*, nov.; Monbuttu (Niangara of recent maps).
4. " *hyposticta*, nov.; Mombasa. "It is possible", he adds "that this specimen was not actually caught at Mombasa. Since Mombasa, however, was

the port of shipment, it is probable that the Cat came from British East Africa, perhaps from some place on the Mombasa to Uganda Railway."[1]

The Serval and Servaline Cats

The present Congo series of the serval and the servaline cats answers conclusively some of the questions on which Pocock expressed the urgent need of further information. First, it proves that the two species do occur together at the same localities, both having been taken at Faradje, in one instance on the same day. Second, that in a series of seven specimens of one and ten of the other, taken at the same locality, there are no intermediates. Third, that both occur abundantly in northeastern Belgian Congo, some 300 miles northwest of Entebbe. This, with the restriction of the servaline type to tropical West Africa, and the extension of the serval type over East and South Africa should apparently settle negatively the question of their supposed relationship as dimorphic forms of a single species.

I have given preference to Pocock's name *pantasticta* for the Faradje form because (1) it has page precedence over *poliotricha*, and (2) because the description (see especially Pocock's tabulation of characters on p. 666) agrees better with the Faradje specimens, notwithstanding the fact that the type locality of *poliotricha* (Monbuttu = Niangara) is nearer Faradje than is the type locality (Entebbe) of *pantasticta*. For this reason also *poliotricha* is provisionally referred to *pantasticta*.

Leptailurus ogilbyi larseni (Thomas)

Felis servalina larseni Thomas, 1913, Ann. Mag. Nat. Hist., (8) XII, July, p. 91. Type locality, "Near Bembe," Congo district of North Angola. Skin without skull.

Represented by one specimen, about two-thirds grown, native-made skin without skull, Zambi, Lower Congo, July 1915.

Mr. Lang informs me that he saw a second specimen evidently adult, in the hands of a native, who declined to part with it. The one obtained appears fully to confirm this form, which is strikingly different from any other form of the servaline group thus far described.

The described forms of the servaline (*Leptailurus ogilbyi*) group are:

1839. *Felis servalina* Ogilby, Proc. Zoöl. Soc. London, p. 94. Sierra Leone. Based on an imperfect skin without skull. Name preoccupied by *Felis servalina* Jardine (1834) for an Indian cat; replaced by *Felis ogilbyi* Schinz (1844, 'Synop. Mamm.,' I, p. 469. Cf. Cabrera, *op. cit.*, p. 426).

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[1] It is further stated that the type was immature, retaining part of the milk dentition, and had been received alive at the Zoölogical Society's Gardens, where it survived about three weeks. It had probably passed most of its life in captivity. Under these circumstances it is difficult to regard this alleged subspecies as properly founded. Aside from the immaturity of the type, the type locality is in doubt, and almost certainly is not Mombasa. The alternative apparently is that it came from Uganda, and hence from the type region of the same author's subspecies *pantasticta*.

1907. [*Felis servalina*] *pantasticta* Pocock, Proc. Zoöl. Soc. London, II, June 18, pp. 665–666. Entebbe, Uganda.

1907. [*Felis servalina*] *poliotricha* Pocock, idem, pp. 665, 666. Monbuttu. Doubtfully distinct from *pantasticta*. (*Supra*, p. 272.)

1907. [*Felis servalina*] *liposticta* Pocock, idem, p. 666. Type locality given as "Mombasa," but probably the type came from a long distance to the interior. Doubtfully distinct from the same author's *F. s. pantasticta*. Type immature, retaining part of milk dentition; reared in confinement. (*Supra*, pp. 271-272.)

1913. *Felis servalina larseni* Thomas, Ann. Mag. Nat. Hist., (8) XII, July, p. 91. Near Bembe, Congo district of North Angola. Skin without skull.

[Since this article was prepared for publication (in October, 1918) a paper by Lönnberg[1] has appeared containing a discussion of the serval and servaline cats (*loc. cit.*, pp. 236–243). His observations and conclusions are based on ten specimens of the servaline group, nearly all from different localities, for the most part geographically widely separated. His allocation of these specimens is (to put it mildly) at least surprising. He accepts Pocock's three forms (*pantasticta, poliotricha, liposticta*) as all valid. He refers to *pantasticta* (type locality, Entebbe) specimens from Lower Congo (Kisantu and Mukimbungu) and from southeastern Belgian Congo (Bukama and Kasongo, Upper Lualaba); to *liposticta* (alleged type locality, Mombasa), specimens from Kisantu, Lower Congo; to *poliotricha*, a specimen from Kasongo, southeastern Belgian Congo. His conclusions are thus stated:

> If these facts are considered from a zoogeographical point of view, the following conclusions may be drawn:
>
> *F. s. pantasticta* is distributed from Lower Congo to Katanga in South East, and Entebbe Uganda (Pocock) in North East;
>
> *F. s. poliotricha* from *Monbuttu* (Pocock) to Kasongo;
>
> *F. s. liposticta* from Lower Congo to Mombasa (! ?), or, if this locality, as is most probable, is erroneous, let us substitute Uganda (?);
>
> *F. s. Larseni* from Northern Angola and Lower Congo over the districts of Lake Leopold II and Kasai to Bangweolo.

He further ventures "to propose that *liposticta* and *Larseni* are identical. The type of *liposticta* was a young animal, and my specimen of the same from Lower Congo is also rather youngish. It appears thus . . . . that the somewhat more spotted *liposticta* is the young of *Larseni*" [!]. He further says, after recalling that "colour phases are of a common occurrence" among cats, "it does not appear impossible that even *Felis servalina pantasticta* and *F. s. liposticta* (*Larseni*) only represent different phases of the same animal." In short, it may be said that these sweeping generalizations rest on a pretty feeble basis of material and are not in accord with the "zoogeographical point of view" of the case.

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[1] 1920, 'Remarks on some Congo Mammals.' Rev. Zool. Africaine, VII, fasc. 3, pp. 236–248.

Lönnberg closes his remarks on the serval and servaline cats with the description (*loc. cit.*, p. 242) of a new subspecies of the serval group, based on a single specimen (sex not stated) from the "Kivu district," which he calls *Felis serval kivuensis*. He says it "is recognized on its large black spots, its great size and large teeth." He considers it as "probably the largest known race" of the serval group, which his measurements of the skull seem to confirm (greatest length 135.5 mm., with the other measurements proportionate). It hence appears to differ from my *Leptailurus serval faradjius* described above (p. 267), which is the smallest of the group thus far indicated (greatest length of skull 120 mm.).]

PROFELIS Severtzow

Profelis SEVERTZOW, 1858, Rev. Mag. Zool., Paris, (2) X, pp. 386, 390. Type, by monotypy, *Felis celidogaster* Temminck = *Felis aurata* Temminck.

Profelis POCOCK, 1917, Ann. Mag. Nat. Hist., (8) XX, November, pp. 340, 350. Same type.

Chrysailurus SEVERTZOW, *loc. cit.*, pp. 389, 390. Type, by monotypy, *Felis neglecta* Gray = *Felis celidogaster* Temminck.

Profelis aurata cottoni (Lydekker)

Plates LXXIV, Figure 2; LXXV

Felis chrysothrix cottoni LYDEKKER, 1906, Proc. Zoöl. Soc. London, II, December 11, pp. 992, 994, Pl. LXX, fig. 1. Type locality, Ituri Forest, Belgian Congo. "Dark smoky-grey" phase. One specimen, skin.

Felis aurata aurata (= *chysothrix* + *rutila* + *cottoni*) POCOCK, 1907, Proc. Zoöl. Soc. London, II, p. 660, Fig. 175, skull (part). *Felis chrysothrix cottoni* LYDEKKER, only.

Profelis aurata POCOCK, 1917, Ann. Mag. Nat. Hist., (8) XX, November, p. 340 (part).

Represented by seven specimens, of which two are native-made, without skulls, collected as follows:

Niangara, 1 (native-made skin without skull).

Akenge, 2 (♂ and ♀, both slightly immature), September 28 and October 20, 1913.

Niapu, 1 (♀ adult), November 21, 1913.

Medje, 2 (1 ♂ with skeleton and 1 ♀), February 28 and August 24, 1910.

Avakubi, 1 (native-made skin without skull).

Collectors' measurements of an adult male (No. 51994) from Medje: Total length, 1160 mm.; head and body, 790; tail, 370; hind foot, 193;

ear, 60. Two adult females (No. 51993, Medje, Pl. LXXIV, fig. 2; No. 51998, Niapu): Total length, 960 (Medje), 1010 (Niapu); head and body, 660. 725; tail, 300, 285; hind foot, 165, 170; ear,—, 55.

Measurements of Three Adult Skulls of *Profelis aurata cottoni*

Cat. No.	Sex	Greatest Length	Condylobasal Length	Basal Length	Zygomatic Breadth	Interorbital Constriction	Postorbital Constriction	Postorbital Processes	Breadth across p^4-p^4	Breadth Braincase	Upper Toothrow	Length p^4
51994	♂	146.2	134.0	125.2	93.0	25.5	26.8	51.6	50.7	55.4	46.4	16.0
51993	♀	127.5	107.3	103.0	77.1	21.2	27.7	44.6	45.6	50.5	37.9	15.0
51998	♀	126.8	114.0	106.8	77.1	20.3	27.1	45.4	45.6	50.0	39.6	15.2

Of the seven specimens, two (from Akenge) are in the red phase, three in the dark gray phase, one in a lighter gray phase, and one (No. 51995, Niangara) intermediate between the dark brown and the red phase. The last mentioned is yellowish brown above, darker along midline of back, and more fulvous on the sides, where it is distinctly spotted with dusky. Both of the red specimens and two of the dark gray ones are wholly without dusky spotting except on the ventral surface. One of the gray specimens (No. 51998, ♀, Niapu; Pl. LXXV) has a small rufous V-shaped mark on the withers and a very small round rufous spot on the left hip, suggesting the possibility of alternative red and gray pelages in the same individual, as some previous writers on the group have assumed. The specimen in light gray pelage (No. 51999, Avakubi, native-made skin) has the lateral lower two-thirds of the body very distinctly spotted with blackish.

As this series was collected within a comparatively small area, it tends to confirm the statement of other observers (cf. Pocock, *loc. cit.*, pp. 658–660) that "red and grey individuals occur side by side in the same localities"— a parallel instance of dichromatism shown by the American jaguarondi cats, *Herpailurus yaguarondi* (Lacépède).

It is almost needless to add that the "*Felis aurata*" group cannot be satisfactorily understood until large series of specimens from several widely separated localities have been carefully compared. The present indications are that not only specimens in the red and in the gray pelages occur together, but that gray individuals with the upperparts unspotted occur at the same localities with others in which the lower flanks at least are more or less distinctly spotted, showing an unquestionable community of origin, but it is hard to believe that there are not a number of fairly well-marked regional forms. For this reason *cottoni* is tentatively recognized as a nameable northeastern form of a group that has a vast range in tropical West Africa.

Felis Linnæus

Felis Linnæus, 1758, 'Syst. Nat.,' 10th Ed., I, p. 41. Type, by tautonymy, *Felis catus* Linnæus.

Catus Fitzinger, 1855, 'Wissen. Nat. Säug.,' Wien, I, p. 265. Type, by tautonymy, *Felis catus* Linnæus

Catolynx Severtzow, 1858, Rev. Mag. Zool., Paris, (2) X, September, pp. 385, 390. Type, by subsequent designation (Pocock, 1917), *Felis catus* Linnæus.

Felis ocreata rubida Schwann

Plates LXXVI to LXXVIII

Felis ocreata rubida Schwann, 1904, Ann. Mag. Nat. Hist., (7) XIII, June, pp. 422, 426. Monbuttu (=Niangara). Skin and skull.

Represented by 24 specimens, of which about one-fourth are immature, another fourth native-made skins without skulls, collected as follows:

Niangara, 8 (all immature), November 24, December 20, 1910; April 7, 1913.

Faradje, 15 (8 skins with skulls, nearly all adult, and 7 native-made skins without skulls), February 22–November 19, 1911; October 5, 1912.

Poko, 1 (skin, juvenile, without skull), August 4, 1911.

As indicated above, the large series representing this form is, with one exception, from two localities, Niangara and Faradje. The Niangara series of eight (topotypes) are all very young, ranging in age from nurslings without functional teeth to one specimen which has the milk teeth fully developed but no indication of the permanent set. This (No. 51954, ♀) has acquired the second pelage and has the adult color tones and markings. The other seven illustrate the gradual acquisition of the adult pattern and coloration. In the youngest of the series (No. 51061, ♀) the only teeth visible in the prepared skull are the upper incisors, which apparently had not cut the gum. The upperparts are pale cinnamon, the markings faintly indicated. There is a broad dusky brown nape patch, and the outer surface of the ear is black, increasing apically to intense glossy black. The facial markings are sharply defined yellowish white and dark reddish brown. The throat and the pectoral and inguinal areas are whitish without spots; the prepectoral bands, the spots of the ventral area, the dark bars on the limbs, and the dark rings on the apical half of the tail are distinctly indicated, strongest on the inside of the limbs and on the tail. This is practically the condition of the rest of the series, the distinctness of the markings gradually increasing with the increase in size and age of the animal. Also the long hairs that fringe the ears are gradually lost, and shorter rufescent hairs replace the intensely black hairs of the outer side. There is a gap in the series from the stage when the principal cusps of the milk dentition have become excluded to the stage reached by the specimen first mentioned, in which the milk teeth have reached full development and the adult pelage has been fully acquired.

In this series of juveniles there is a considerable range of individual variation in the tone of the ground color, which varies in different specimens from dingy gray to cinnamon. Only one, however, represents the gray phase, in which the general tone is dingy gray, the others varying from pale to deep cinnamon. Also one is albinistic, the anterior half of the ventral area being pure white to the base of the hairs, the white area also including the fore and hind limbs, with an extension upward on the body in front of the shoulders.

The Faradje series consists of thirteen adults (Pl. LXXVI, fig. 3) and two half-grown young (Pl. LXXVI, figs. 1 and 2). The single immature specimen from Poko is similar to the half-grown specimens from Faradje. Of these sixteen specimens nine are from freshly killed animals and seven are native-prepared skins, the latter without, of course, skulls or flesh measurements, but valuable as illustrating individual variation in color and markings, and helping to show the uncertain basis of forms founded on single specimens. While the entire series is unquestionably referable to *rubida* of the *ocreata* group, it presents a wide range of color variation irrespective of age or sex.

The Faradje specimens may be divided into two extremes, one distinctly gray, the other rufescent, which intergrade through intermediate stages. In extreme specimens of the gray phase the general effect is distinctly gray, with a dark brown median dorsal band extending from the forehead to the base of the tail. The sides of the body, between the median dark band and the ventral area, are marked with deep brown transverse bands composed of confluent or (in different specimens) more or less confluent spots. In some specimens there is a tendency in the spots near the median line of the back to an elongate form, with the length much greater than the breadth. The ventral surface varies from cream-white to pale fulvous, spotted and blotched with a much darker tone. In the other extreme the general effect is rufescent, although the light tips of the hairs give a slight grayish tone, while the cross bands and median dorsal stripes are pale rufous cinnamon, the underparts are deep fulvous. The greater part of the series is intermediate, but some four or five of the specimens can readily be referred to the gray end of the series and a rather less number to the rufescent phase. Of the fifteen Faradje specimens three of the gray series are albinistic, having white feet and areas of white on the body, while one is whitish gray throughout the whole upperparts and limbs and has white underfur, a fact that may have a bearing on the tendency to grayness.[1] (See Pls. LXXVII–LXXVIII for photographic illustrations of color variation.)

Another striking feature of individual variation is the color of the underfur. On the median dorsal area the underfur in adults varies in different individuals from pale plumbeous at base, and fulvous apically to nearly uniform blackish or dusky. The basal third or half in most specimens (including juveniles) is more or less plumbeous, the apical portion fulvous (light or deep fulvous) in different specimens. In some the whole underfur, except the extreme base, is fulvous, in others dark plumbeous, or even blackish. The underfur is usually much shorter and different in color in the same individual over the shoulders from that of the middle and lower back where the pelage is much longer.

In regard to size, the present series of specimens which have available measurements is too small to form a basis for generalization, but it may be noted that the three females are larger in both external and cranial dimensions than the two males. It would seem that males do not always exceed the females of their species in size, and that size alone is not a trustworthy criterion for the determination of sex in all cats.

Felis ocreata ugandæ Schwann

Felis ocreata ugandæ Schwann, 1904, Ann. Mag. Nat. Hist., (7) XIII, June, p. 424. Mulema, Uganda. Alt. 5000 feet. Two specimens, skins with skulls.

Represented by 1 specimen, as follows:

Garamba, 1 (adult ♂, skin and skeleton), May 20, 1912.

This specimen agrees well in size and coloration with the description of *F. o. ugandæ*, being larger and darker than any of the large series of *F. o. rubida*, and is from farther north and distinctly in the Sudan district and the Nile drainage.

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[1] One of the albinistic specimens has all the feet white and a large white spot on the lower throat; another has the hind feet, the whole of the fore limbs, and the greater part of the ventral surface white, also a large white spot on each hip, a band of white over the back of the neck, with a posterior extension over the shoulder to the thoracic region on the right side, and a broad upward extension on the left side, nearly to the median line behind the shoulder. The third specimen has a diffuse whiteness everywhere, giving a whitish effect to the dorsal aspect, the white underfur showing through the blackish tips of the overhair. All the limbs and the ventral area are creamy white.

As shown below in the table of measurements for *F. o. rubida*, the specimen here referred to *ugandæ* considerably exceeds the measurements of the *rubida* series, and agrees very closely with those given by Hollister[1] for Heller's *F. o. nandæ*, the type locality of which is not far from the type locality of *ugandæ*. In all probability *nandæ* and *ugandæ* are to be referred to the same regional form.

Collectors' Measurements of Five Specimens of *Felis ocreata rubida* and One of *F. o. ugandæ*

	Cat. No.	Locality	Sex	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
Felis ocreata rubida	51958	Faradje	♀	775	475	300	128	56
	51959	"	♀	825	523	302	127	59
	51971	"	♀	800	485	315	128	52
	51960	"	♂	710	415	295	125	56
	51957[2]	"	♂ juv.	738	442	296	122	58
Felis ocreata ugandæ	51970	Garamba	♂	900	555	345	133	—

Measurements of Six Skulls of *Felis ocreata rubida* and One of *F. o. ugandæ*

	Cat No.	Sex	Greatest Length	Condylobasal Length	Basal Length	Zygomatic Breadth	Interorbital Constriction	Postorbital Constriction	Breadth Braincase	Mastoid Breadth	Breadth across p^4-p^4	Upper Toothrow	Length p^4
F. rubida	51958	♀	84.6	80.9	74.3	59.4	15.5	31.7	40.5	38.8	35.5	27.6	11.0
	51959	♀	91.1	84.0	77.9	61.7	16.5	30.6	42.0	41.7	35.7	28.5	11.3
	51971	♀	86.4	79.2	72.7	60.2	14.9	35.5	43.9	38.1	33.7	27.3	10.3
	51960	♂	82.7	77.9	71.4	56.5	14.4	32.8	41.6	38.8	35.2	28.4	10.7
	51967	♂	90.4	85.4	78.1	62.5	15.4	32.9	42.6	40.5	36.5	30.0	10.9
	51957[2]	♂ juv.	83.1	77.5	71.5	59.1	14.8	31.5	43.3	40.0	36.0	28.2	10.9
F. ugandæ	51970[3]	♂	102.0	93.0	85.6	67.3	16.6	29.7	43.9	44.1	36.8	31.8	11.8

Type Locality and Authority for *Felis caracal* Schreber

Schreber's Plate cx[4] is legended "*Felis caracal* Buff.," and carries the same designation in the list of plates (*loc. cit.*, p. 587), but instead of being accredited to Buffon, as in cases where Schreber's plates are copies of Buffon's, it is indicated as original ("Eigne Zeichnung"). A comparison of the two plates shows that they have little in common. According to Sherborn,[1] the plate was issued before July 1776, and the text it illustrates not till sometime in 1777. Although Schreber cites Buffon, his description, like his illustration, is based on a specimen from the "Vorgebirge," Cape of Good Hope, received from Hauptmann Bodenschaz. The *Felis caracal* of Schreber has thus no dependence upon Le Caracal of Buffon, but a wholly independent basis, and a widely different type locality, notwithstanding his citation of Buffon in his references and accrediting the name *Felis caracal* to Buffon on his Plate cx, doubtless as an act of courtesy for his use in a technical sense of Buffon's vernacular name caracal.

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[1] 1918, U. S. Nat. Mus. Bull. 99, pt. 1, pp. 178–179.

[2] With permanent teeth, but premolars not fully up.

[3] From Garamba.

[4] 1776, 'Säugthiere,' Pl. cx; *op. cit.*, 1777, III, pp. 413, 587.

In 1776 P. L. S. Müller, in the supplement volume of his 'Natursystems' (p. 30, No. 15) also, and independently, gave the name *Felis caracal*, the date of publication being practically synchronous with that of the *Felis caracal* of Schreber, both having the year date 1776. Müller's name was based exclusively on Buffon's caracal. He gives, however, an erroneous type locality as he says "Das Vaterland ist Arabien," not however without mitigating circumstances. Buffon, in his first account of "Le Caracal" says: "Cet animal est commun en Barbarie, en Arabie & dans tous les pays qu' habitent le lion, la panthère & l'once. . . ."[2] Later, however, in connection with Bruce's inedited note on "le caracal de Nubie,"[3] he compares the Nubian caracal with "celui de Barbarie, dont nous avons donné la figure (tome IX, planche XXIV)," thus establishing the type region of his original specimen, which without much risk of error may be definitely assigned as the vicinity of Constantine, Algiers, whence so many of the carnivores received alive for exhibition in the Royal Menagerie of Versailles at that time were derived. As stated in the original account of Buffon's "Caracal de Barbarie," the description and plate were based on a living animal, of a very ferocious disposition, kept in a dark cage, and thus not able to be very carefully studied. Three years later it died, and Daubenton[4] then gave a new description of its external characters, with detailed measurements, and also of its anatomy, stating it to be the individual figured in Buffon's plate XXIV. No reference, however, is here made to its geographic origin.

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[1] 1891, Proc. Zoöl. Soc. London, p. 588.
[2] 1761, 'Hist. Nat.,' IX, p. 262, Pl. XXIV.
[3] 1776, 'Hist. Nat.,' Suppl., III, p. 232.
[4] 1764, Buffon's 'Hist. Nat.,' XII, pp. 442–449.

It is thus evident that *Felis caracal* Schreber and *Felis caracal* Müller relate to quite different geographical forms, the home of the first being the Cape of Good Hope region, that of the other the opposite end of the African continent or Barbary. If the name is accepted from Schreber's Plate cx, published in the early part of the year 1776, as is customary in similar cases, it may be accepted as having priority over Müller's, unless an earlier date can be demonstrated for Müller's publication of the name, thus establishing the type locality of *Felis caracal* Schreber as Table Mountain, near Cape Town, South Africa. Müller's name *Felis caracal*, under the above ruling, is untenable, and should be replaced by *Felis berberorum* Matschie (1892), the type locality of which is given as Staonely, near Constantine, Algeria, near the probable original source of Buffon's Le Caracal and, as shown above, the type locality of *Felis caracal* Müller. The correct name of the "le caracal de Barbarie" of Buffon is therefore *Caracal caracal berberorum* (Matschie).

The name *Felis caracal* has also been ascribed to Gueldenstaedt, published also in 1776.[1] His name as cited by Schreber appears in the form of a binomial, but examination of Gueldenstaedt's text shows that this was due to Schreber's rendering and is not the form employed by Gueldenstaedt, as already shown by Matschie,[2] who quotes Gueldenstaedt's name and diagnosis, as follows: "Caracal: Felis auriculis apice barbatis, extus nigris; capite, corpore et cauda unicoloribus fuscentibrunneis." It was based on Buffon's Le Caracal. The name ascribed by Schreber to this author, as said above, is Schreber's and not Gueldenstaedt's, and has thus no nomenclatural status.

The *Felis caracal*, γ *nubicus* Fischer (1829) was obviously based on Buffon's "le caracal de Nubie" and, on the basis of Bruce's inedited note on which it is founded, the type locality is Meroe, Nubia. This form should stand of course as *Caracal caracal nubicus* (Fischer).

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[1] 1776, Novi Comm. Acad. Sci. imp. Petropolitanæ, XX (for 1775), p. 500.

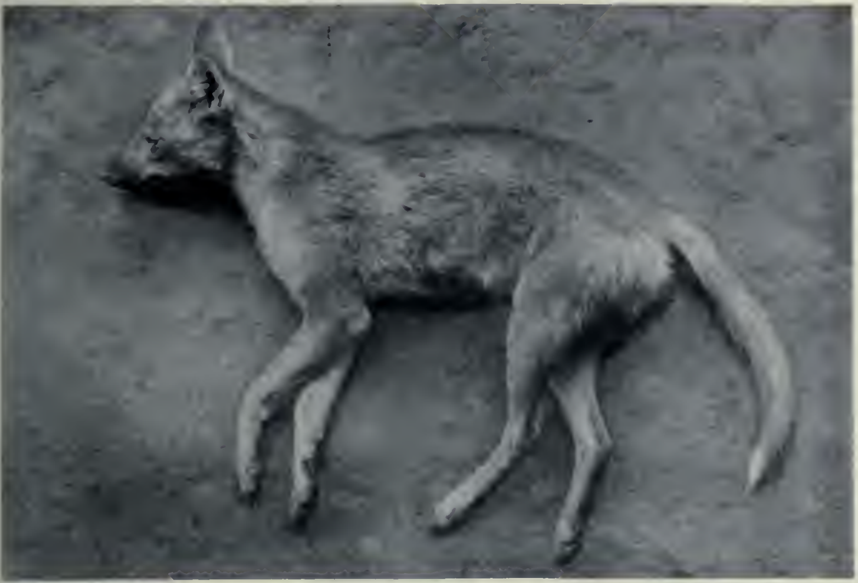
[2] 1912, Sitzungsb. Ges. Naturf. Freunde Berlin, p. 57. See also Allen, 1920, Journ. Mamm., I, No. 2, February, p. 90.

PLATES VI TO LXXVIII

PLATE VI

Fig. 1. *Thos anthus soudanicus* (Thomas). Male adult, Amer. Mus. No. 52049, Faradje, February 25, 1912. Total length of animal, 970 mm.

Fig. 2. *Thos anthus soudanicus* (Thomas). Female adult, Amer. Mus. No. 52052, Faradje, December 5, 1912. Total length of animal, 930 mm. Photographs from specimens in the flesh.



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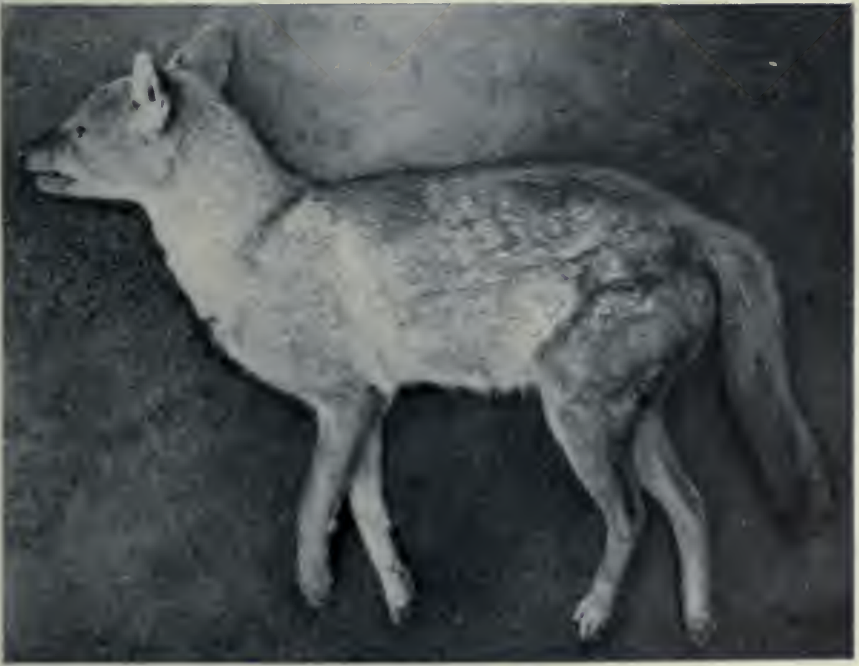

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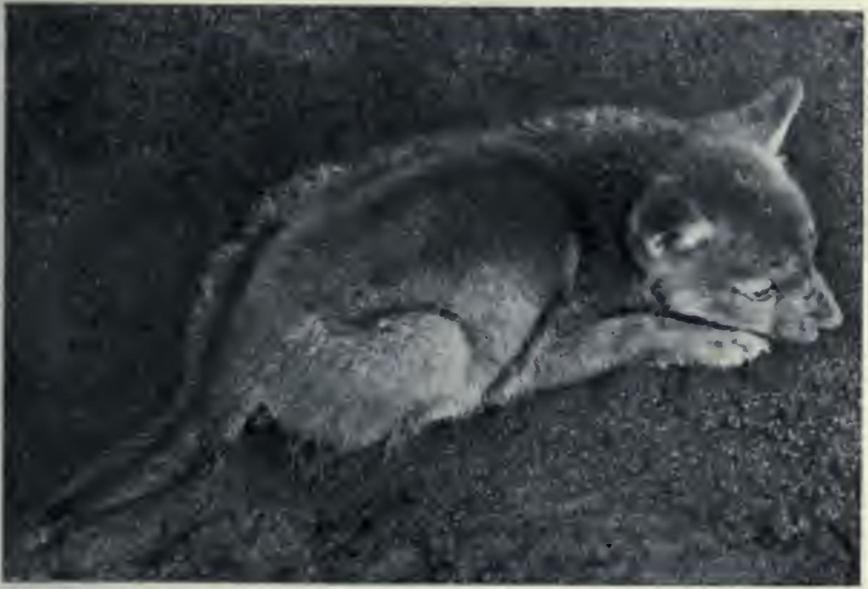
PLATE VII

Fig. 1. *Thos anthus soudanicus* (Thomas). Male juvenile, Amer. Mus. No. 52053, Niangara, November 16, 1910. Total length of animal, 399 mm. Photograph from live animal.

Fig. 2. *Mellivora capensis cottoni* Lydekker. Female adult, Amer. Mus. No. 51951, Niapu, December 9, 1913. Total length of animal, 870 mm. Photograph from specimen in the flesh.



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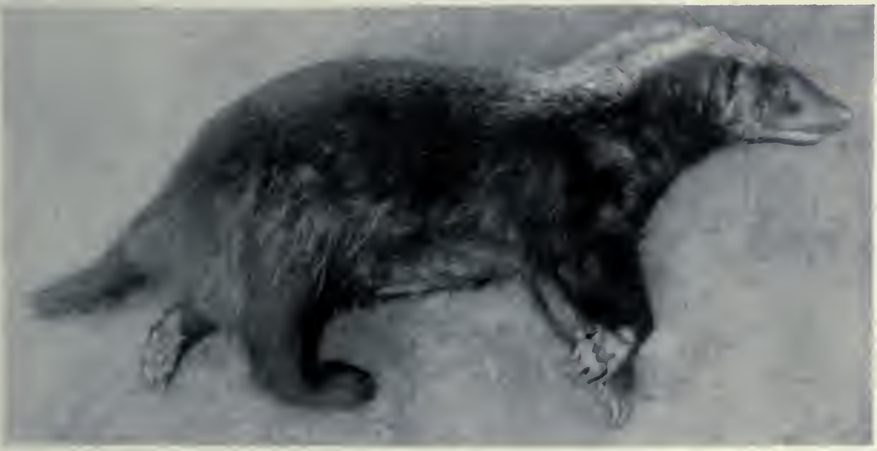

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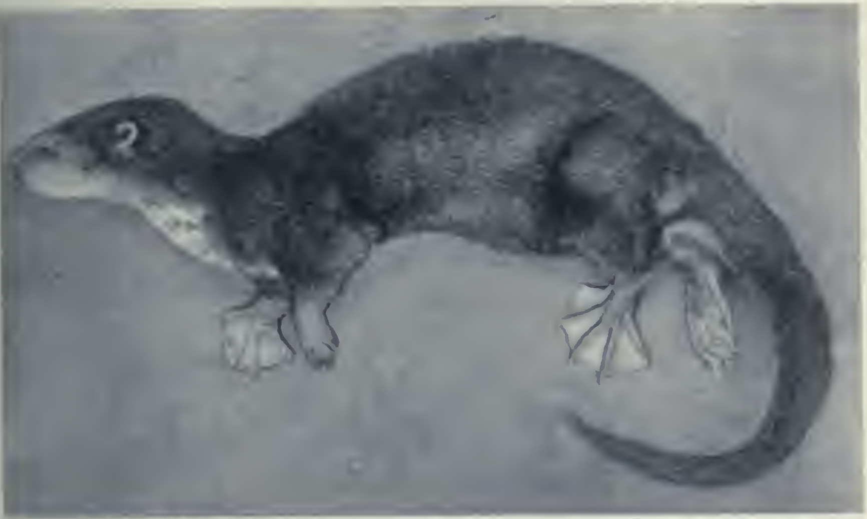
PLATE VIII

Fig. 1. *Lutra maculicollis* Lichtenstein. Female adult, Amer. Mus. No. 51825, Faradje, January 7, 1913. Total length of animal, 960 mm.

Fig. 2. *Lutra maculicollis* Lichtenstein. Male juvenile, Amer. Mus. No. 51822, Faradje, February 28, 1911. Total length of animal, 460 mm. Photographs from specimens in the flesh.



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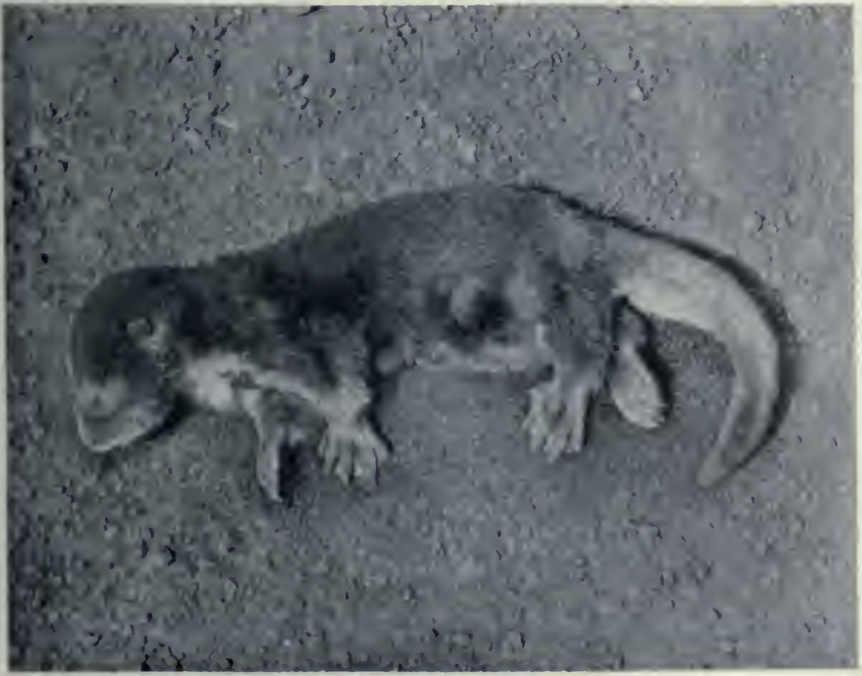

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Plate IX

Fig. 1. *Micraonyx cinerea* (Illiger). Amer. Mus. No. 29731, Iwahig, Palawan, Philippine Islands.

Fig. 2. *Aonyx capensis* (Schinz). Female adult, Amer. Mus. No. 51849, Faradje, February 2, 1913. Total length of animal, 950 mm.

Fig. 3. *Aonyx capensis* (Schinz). Male adult, Amer. Mus. No. 51847, Faradje, January 22, 1910. Total length of animal, 1090 mm. Photographs from stuffed skins.

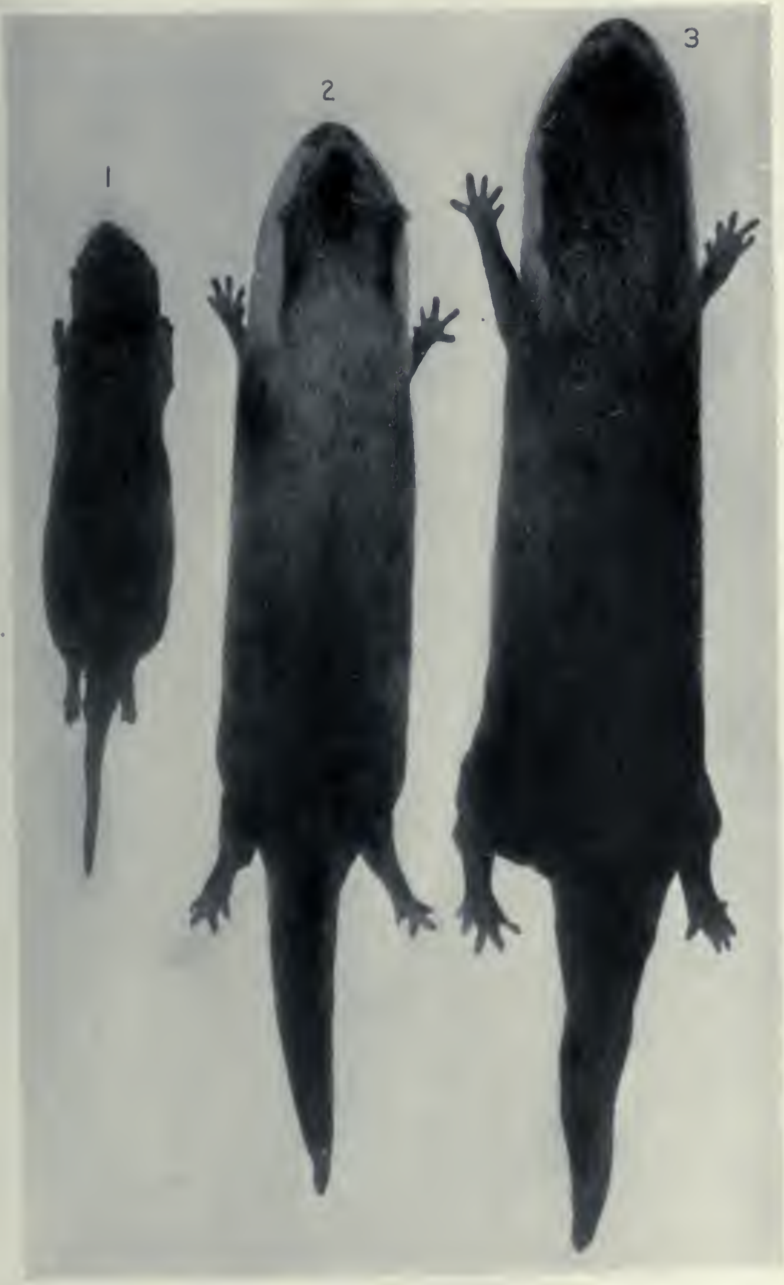
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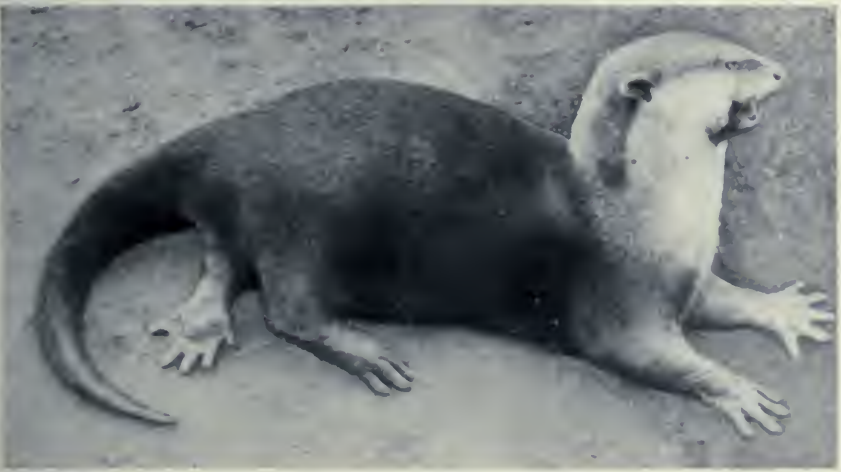
PLATE X

Fig. 1. *Aonyx capensis* (Schinz). Male adult, Amer. Mus. No. 51847, Faradje, January 22, 1910. Total length of animal, 1090 mm. Photograph from specimen in the flesh.

Figs. 2 and 3. *Aonyx capensis* (Schinz). Male juvenile, Amer. Mus. No. 51839, Faradje, March 16, 1911. Total length of animal, 665 mm. Photograph from live animal.



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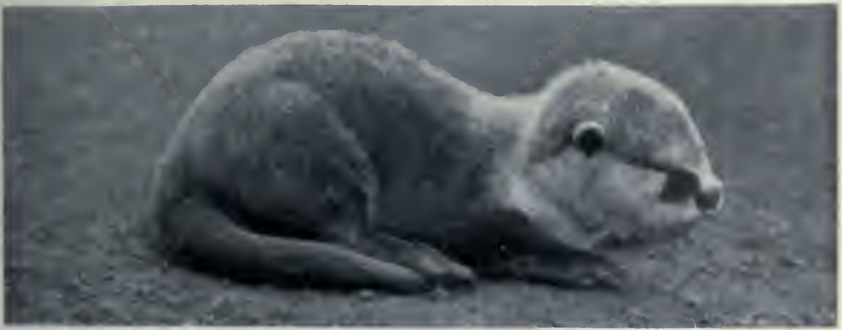

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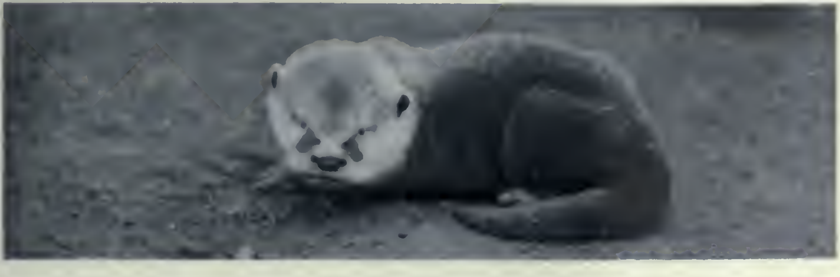

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Plate XI

Habitat of *Lutra maculicollis* Lichtenstein and *Aonyx capensis* (Schinz). Bima River, near Niapu, January 1914.

PLATE XII

Civettictis civetta orientalis (Matschie). Male adult, Amer. Mus. No. 51811, Niapu, December 26, 1913. Total length of animal, 1350 mm. Photograph from specimen in the flesh.

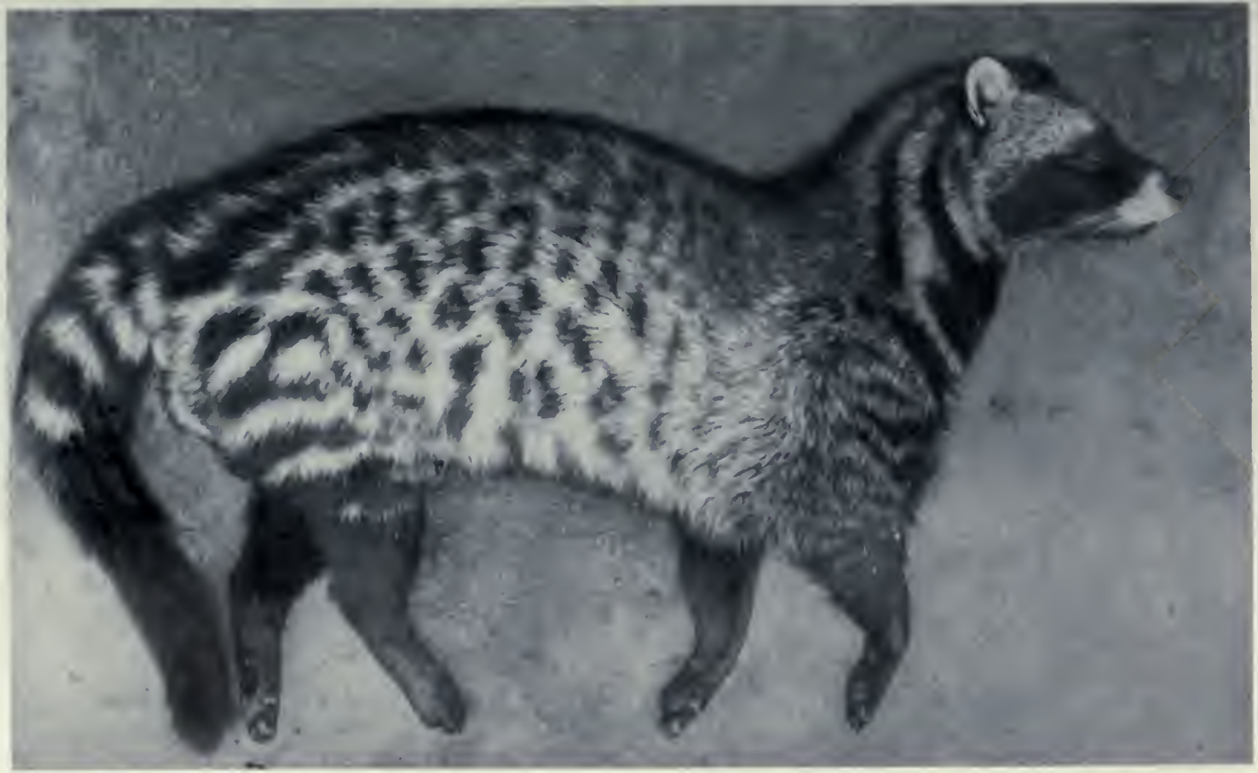
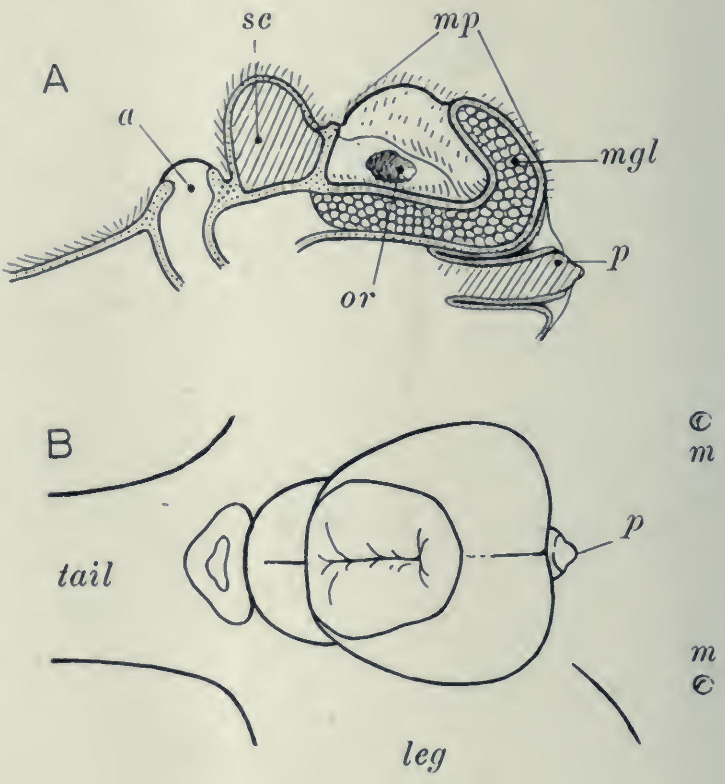


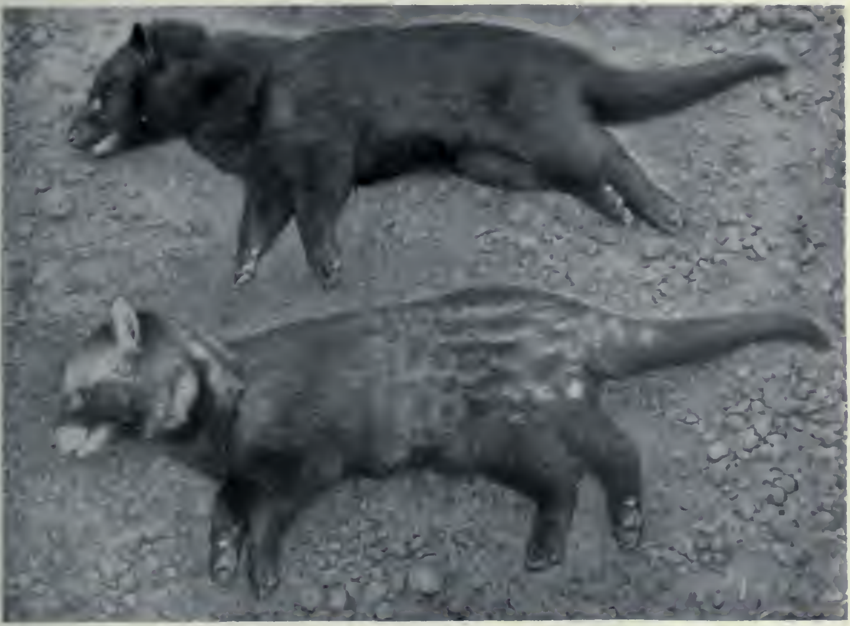
Plate XIII

Fig. 1. *Civettictis civetta orientalis* (Matschie). Upper, melanistic specimen, female juvenile, Amer. Mus. No. 51819, Medje, August 25, 1910. Total length of animal, 500 mm. Lower, normally colored specimen, female juvenile, Amer. Mus. No. 51792, Medje, August 25, 1910. Total length of animal, 535 mm. Taken from same litter.

Fig. 2. *Civettictis civetta orientalis* (Matschie). Male adult, Amer. Mus. No. 51797, Akenge, October 4, 1913. Total length of animal, 1350 mm. Inferior view of genitalia, musk pouch and anus. Photographs from specimens in the flesh.

The diagrams below explain Fig. 2, showing genitalia, musk pouch and anus. A, longitudinal section; B, inferior view, outline from photograph. *a*, anal pouch leading to anus; *m*, rudimentary mammæ of male; *mgl*, musk glands; *mp*, musk pouch; *or*, principal orifice of musk gland; *p*, penis; *sc*, scrotum.





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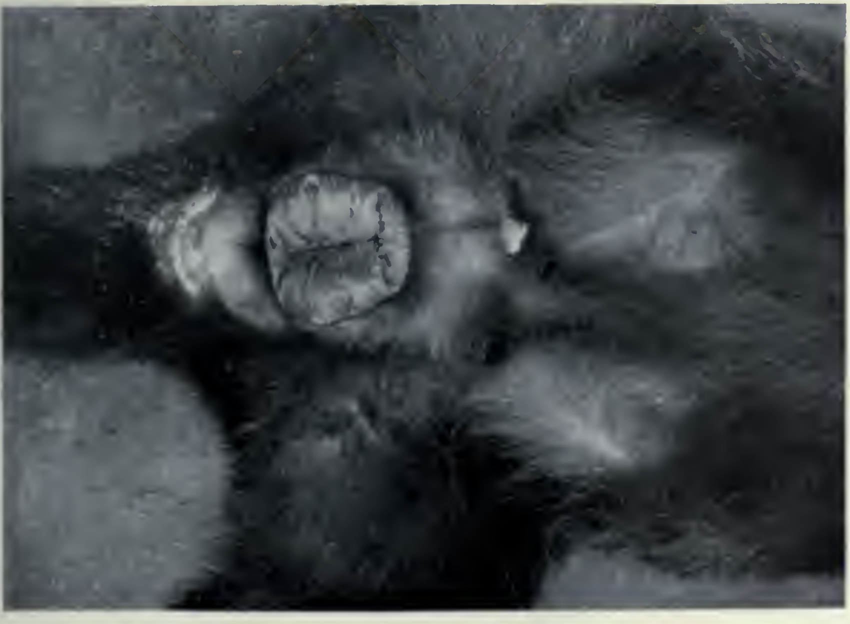

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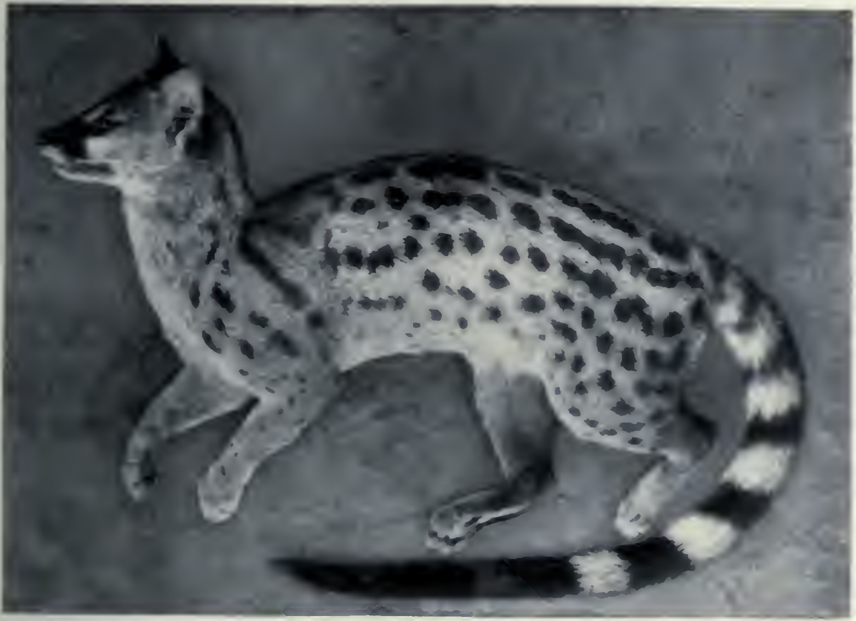
Plate XIV

Fig. 1. *Genetta pardina fieldiana* Du Chaillu. Male adult, Amer. Mus. No. 51541, Niapu, January 9, 1914. Total length of animal, 945 mm.

Fig. 2. *Genetta servalina* Pucheran. Female adult, Amer. Mus. No. 51577, Niapu, January 19, 1914. Total length of animal, 950 mm. Photographs from specimens in the flesh.



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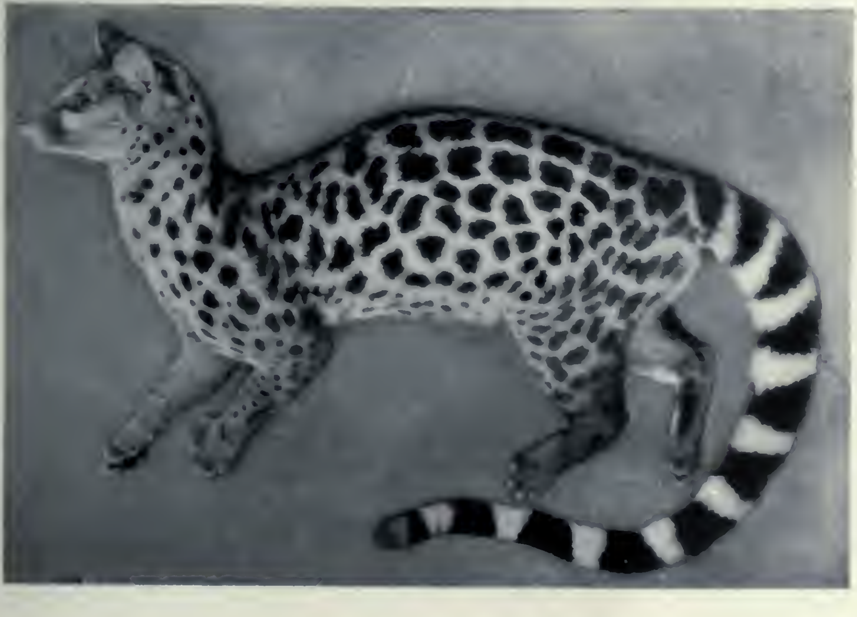

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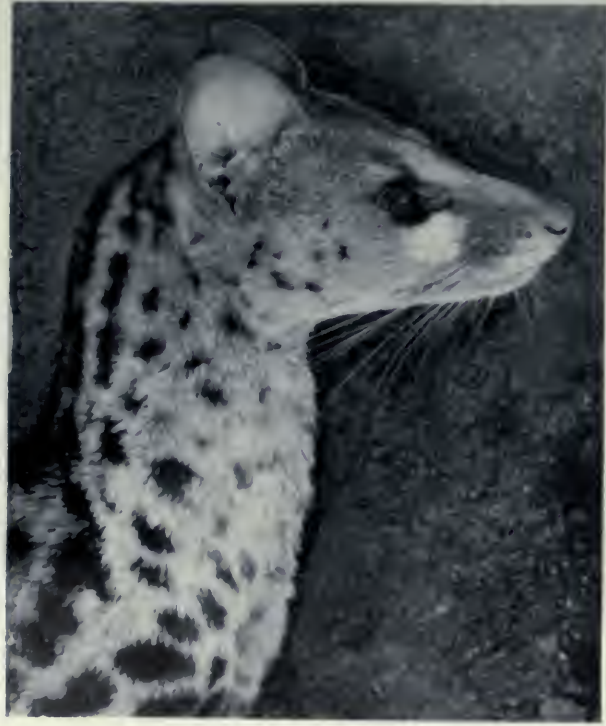
PLATE XV

Fig. 1. *Genetta servalina* Pucheran. Male adult, Amer. Mus. No. 51559, Niapu, November 28, 1913. Total length of animal, 1035 mm.

Fig. 2. *Genetta pardina fieldiana* Du Chaillu. Male adult, Amer. Mus. No. 51541, Niapu, January 9, 1914. Total length of animal, 945 mm. Photographs from specimens in the flesh.



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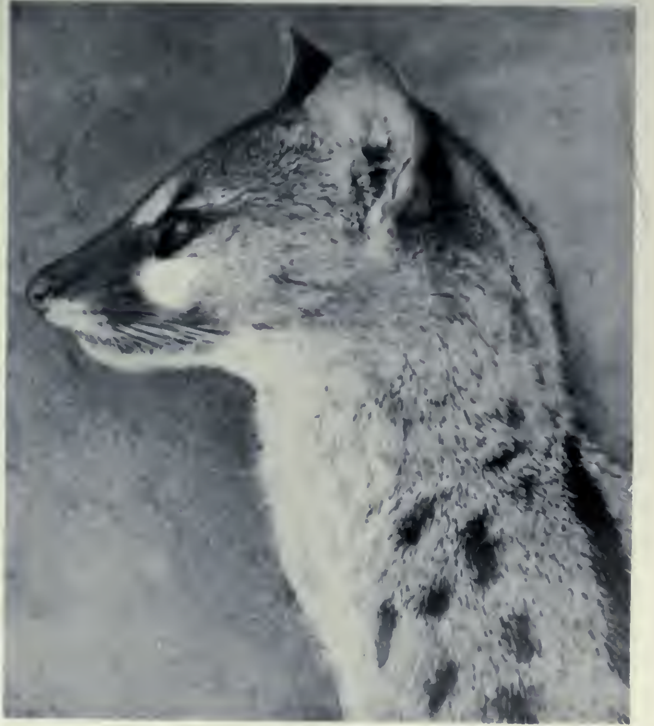

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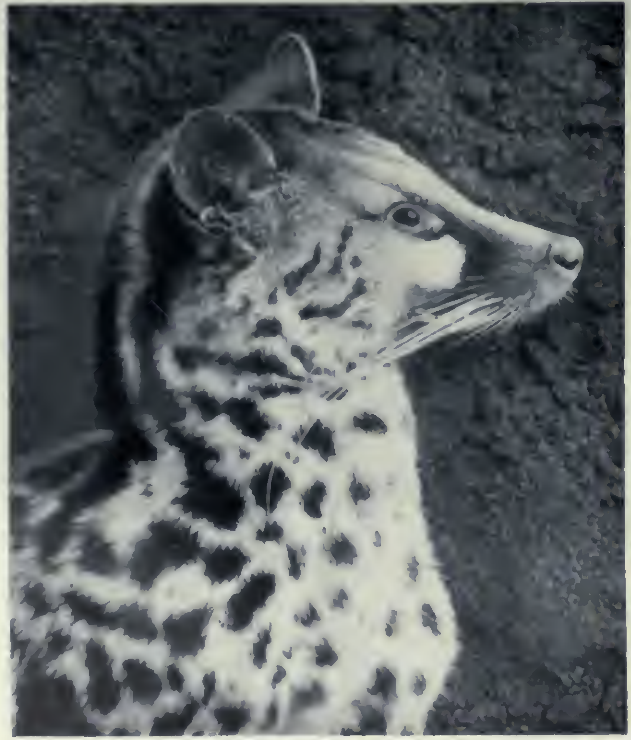
Plate XVI

Genetta victoriæ Thomas. Male adult, Amer. Mus. No. 51409, Akenge, September 29, 1913. Total length of animal, 975 mm. Photograph from specimen in the flesh.

Plate XVII

Fig. 1. *Genetta victoriæ* Thomas. Male adult, Amer. Mus. No. 51409, Akenge, September 29, 1913. Total length of animal, 975 mm.

Fig. 2. *Poiana richardsoni ochracea* Thomas and Wroughton. Male subadult, Amer. Mus. No. 51439, Akenge, October 25, 1913. Total length of animal, 695 mm. Photographs from specimens in the flesh.



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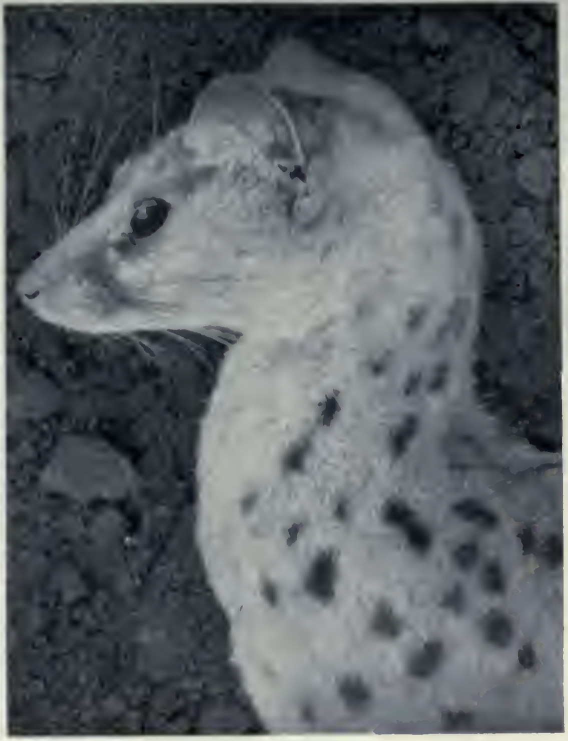

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PLATE XVIII

Osbornictis piscivora J. A. Allen. Type, male adult. Drawn by Richard Deckert from a skin, Amer. Mus. No. 51514, Niapu, December 1, 1913. Total length of animal, 910 mm.

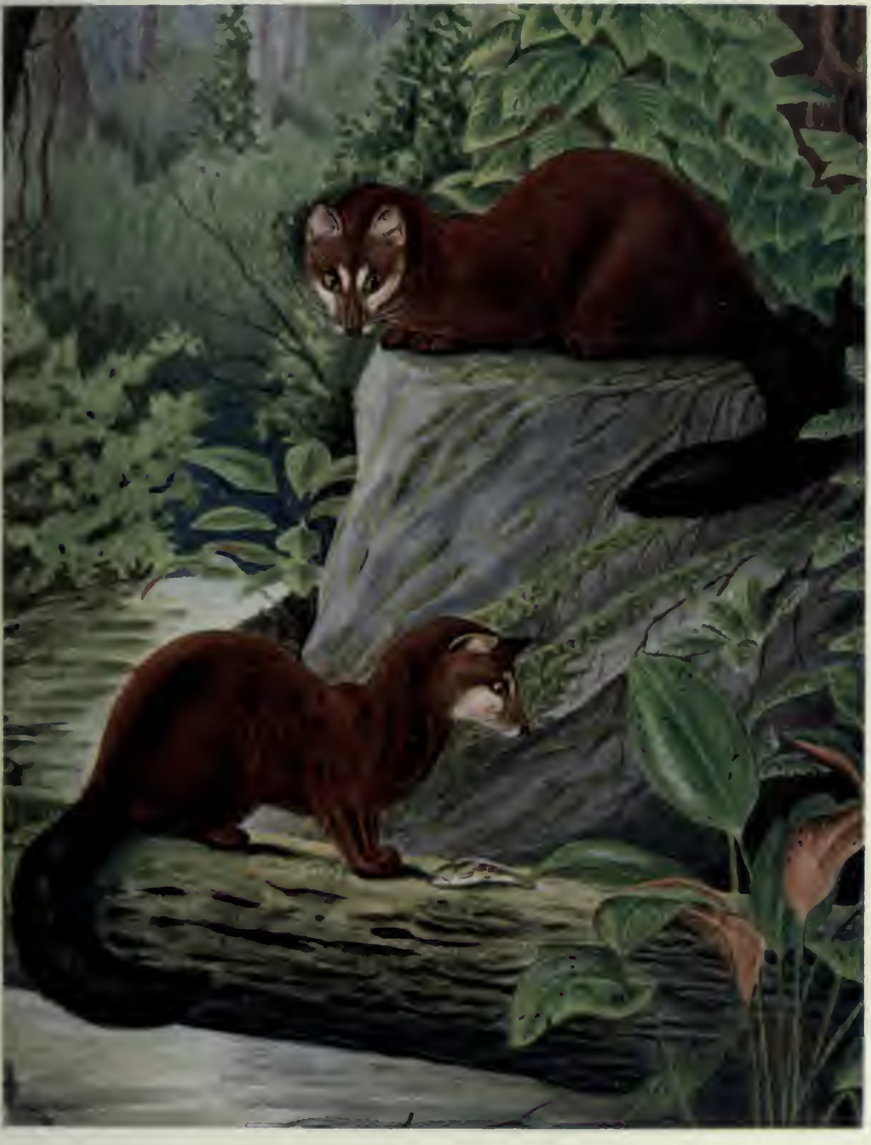


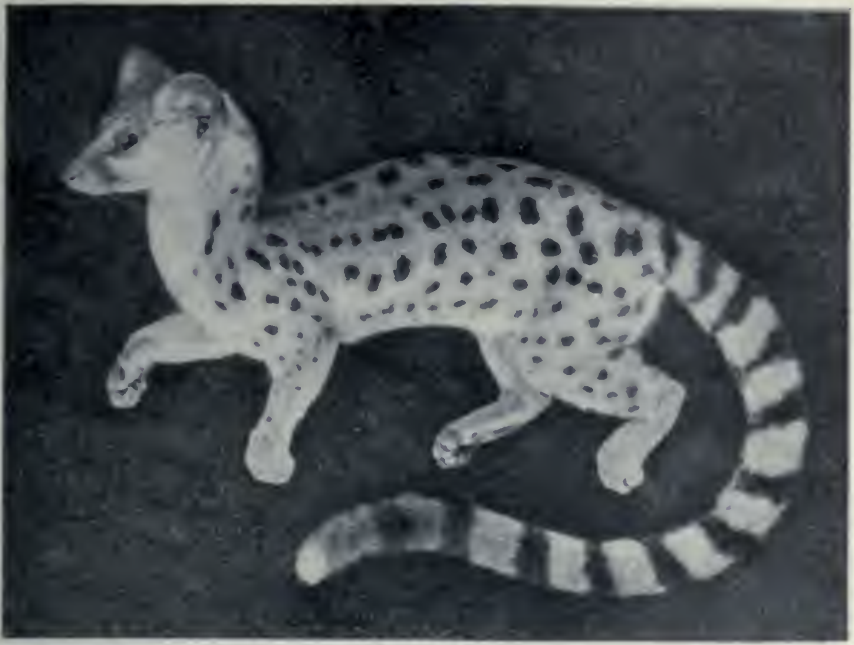
PLATE XIX

Habitat of *Osbornictis piscivora* J. A. Allen. One of the larger forest brooks at the height of the rainy season. Niapu, January 8, 1914. This represents the actual place where the type specimen was taken.

Plate XX

Fig. 1. *Poiana richardsoni ochracea* Thomas and Wroughton. Male subadult, Amer. Mus. No. 51439, Akenge, October 25, 1913. Total length of animal, 695 mm.

Fig. 2. *Nandinia binotata* (Gray). Female adult, Amer. Mus. No. 51513, Niapu, January 22, 1914. Total length of animal, 1050 mm. Photographs from specimens in the flesh.



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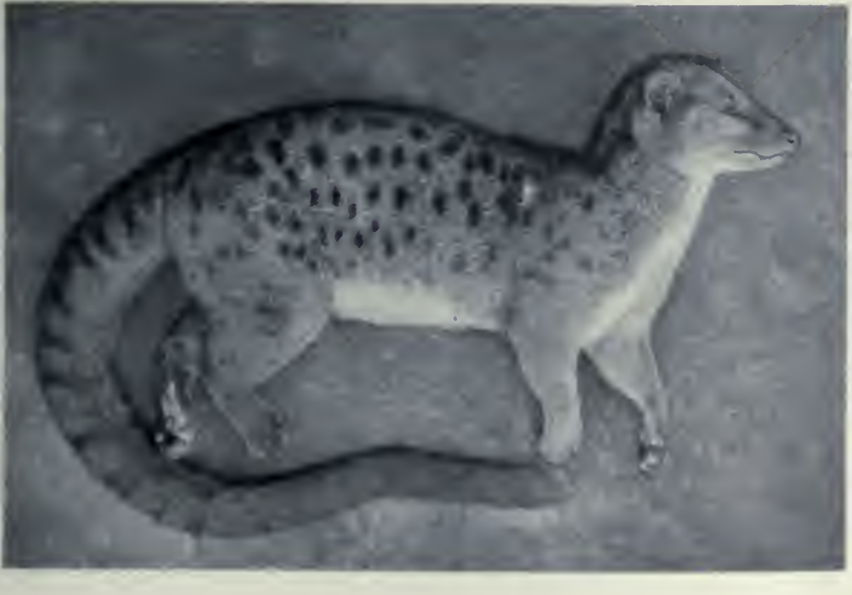

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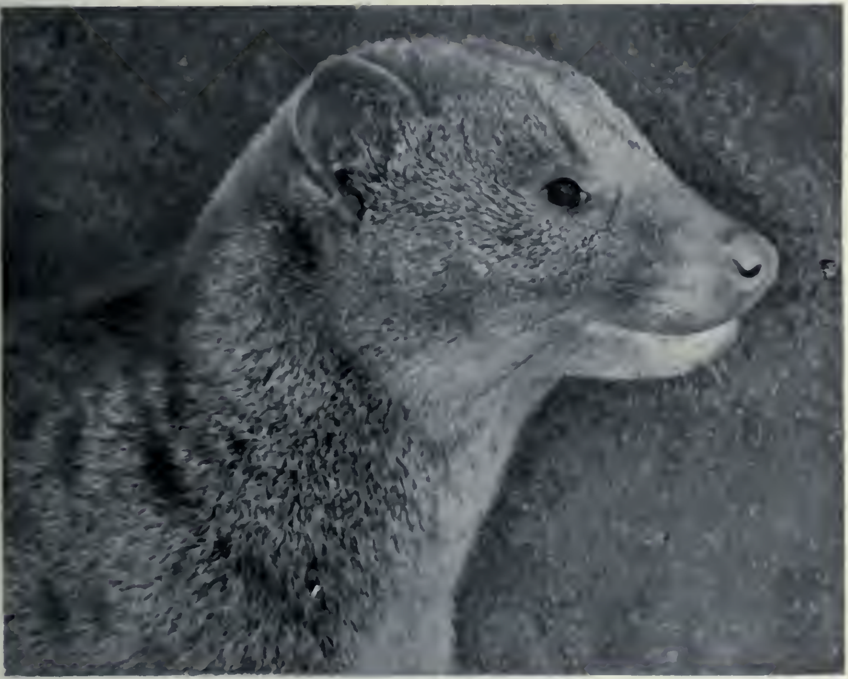
Plate XXI

Fig. 1. *Nandinia binotata* (Gray). Male adult, Amer. Mus. No. 51497, Niapu, December 1, 1913. Total length of animal, 1370 mm. Photograph from specimen in the flesh.

Fig. 2. *Nandinia binotata* (Gray). Male juvenile, Niangara. Photograph from live animal.



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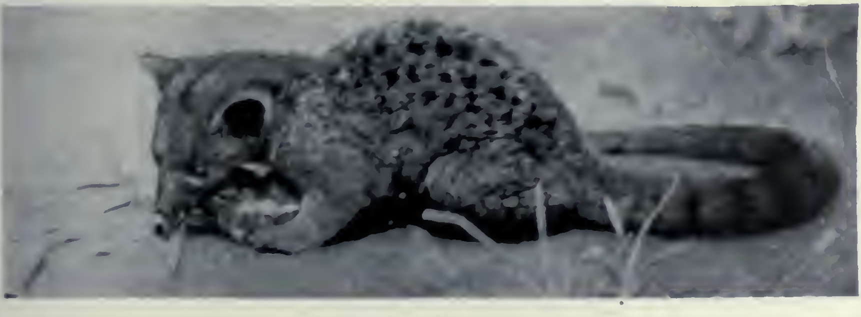

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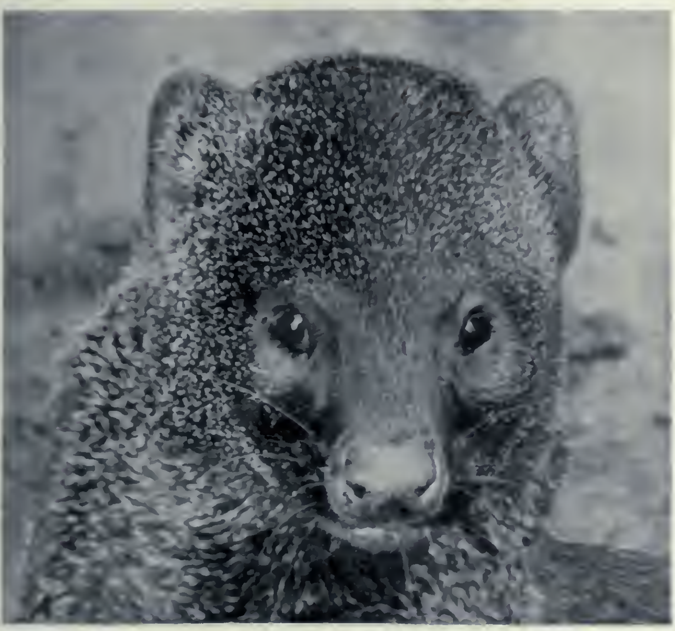
PLATE XXII

Figs. 1 and 2. *Herpestes ichneumon funestus* (Osgood). Male subadult, Amer. Mus. No. 51593, Medje, June 25, 1914. Total length of animal, 835 mm. Photographs from specimen in the flesh.



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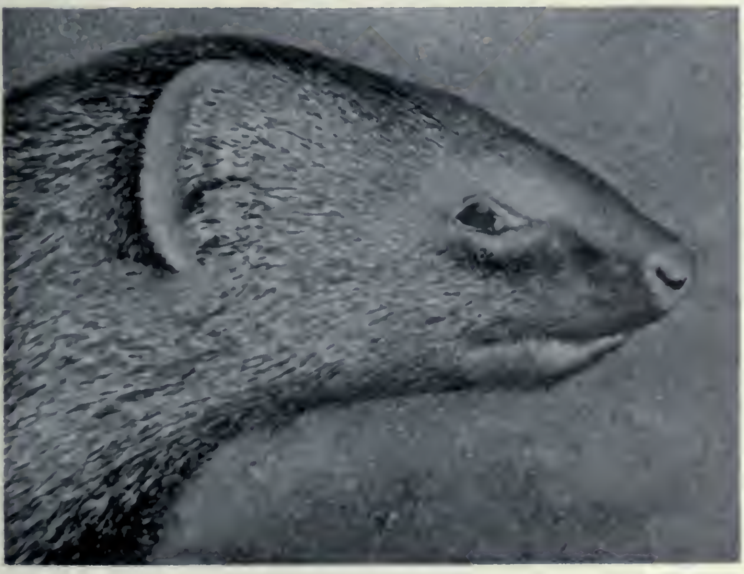

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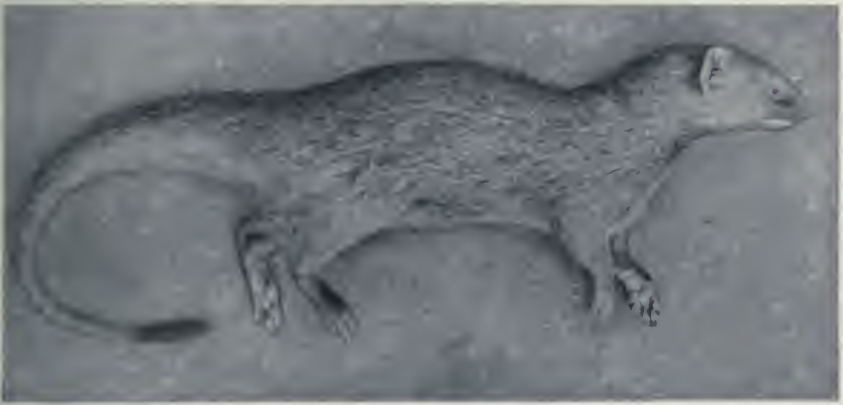
PLATE XXIII

Fig. 1. *Herpestes ichneumon funestus* (Osgood). Male subadult, Amer. Mus. No. 51593, Medje, June 25, 1914. Total length of animal, 835 mm. Photograph from specimen in the flesh.

Figs. 2 and 3. *Galerella ochracea ochracea* (Gray). Male adult, Amer. Mus. No. 51109, Faradje, August 19, 1912. Total length of animal, 495 mm. Photographs from live animal.

Fig. 4. *Galerella ochracea ochracea* (Gray). Male adult, Amer. Mus. No. 51184, Faradje, February 28, 1912. Total length of animal, 532 mm. Photograph from specimen in the flesh.



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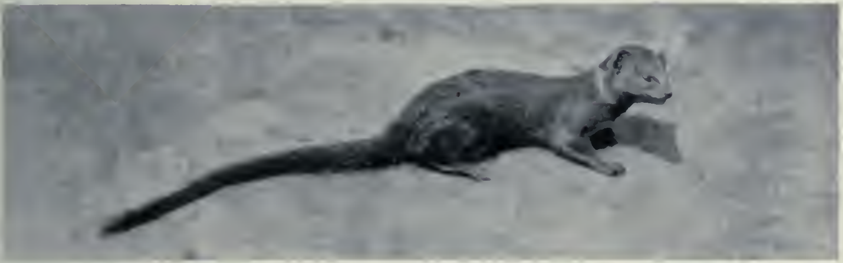

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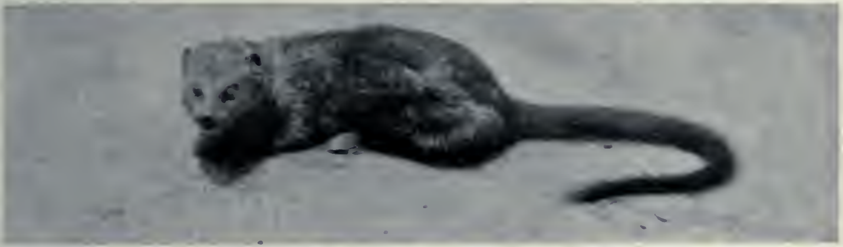

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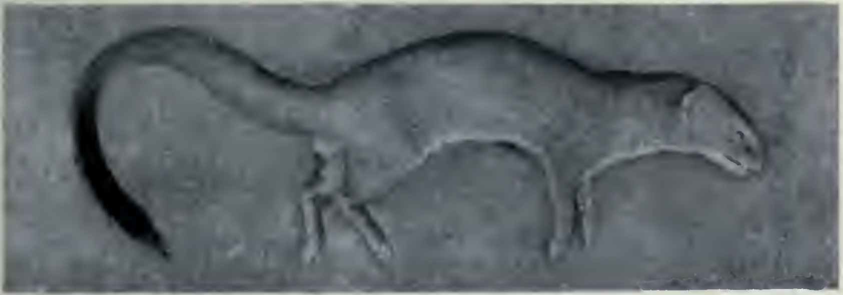

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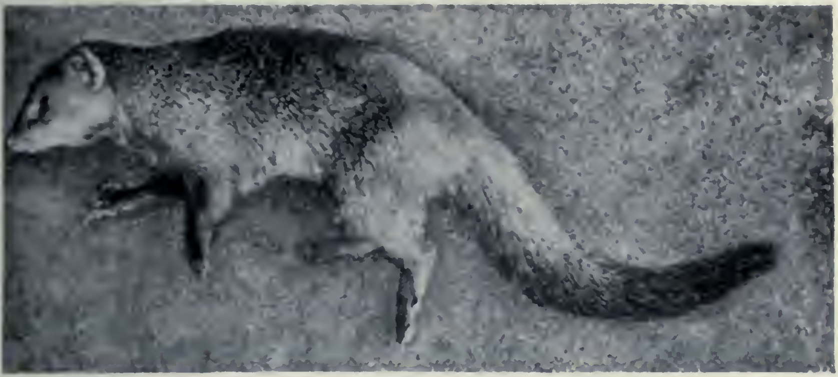
PLATE XXIV

Fig. 1. *Helogale hirtula robusta*, new subspecies. Female adult, Amer. Mus. No. 51608, Niangara, April 20, 1913. Total length of animal, 490 mm. Photograph from specimen in the flesh.

Fig. 2. *Mungos gothneh* (Heuglin and Fitzinger). Female juvenile, Amer. Mus. No. 51128, Faradje, May 8, 1911. Total length of animal, 372 mm. Photograph from live animal.

Fig. 3. *Mungos gothneh* (Heuglin and Fitzinger). Poko, July 1913. Photograph from live animal.

Fig. 4. *Mungos gothneh* (Heuglin and Fitzinger). Female adult, Amer. Mus. No. 51127, Faradje, March 17, 1911. Total length of animal, 490 mm. Photograph from specimen in the flesh.



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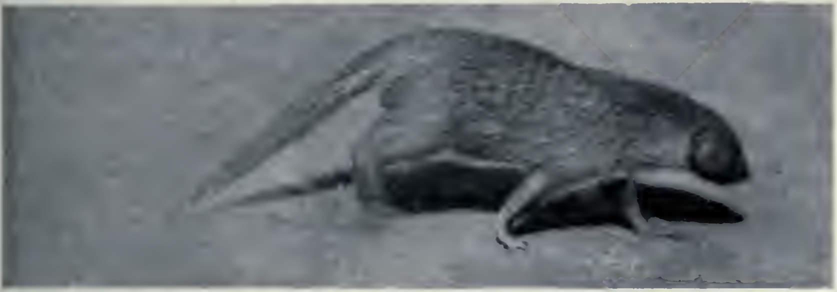

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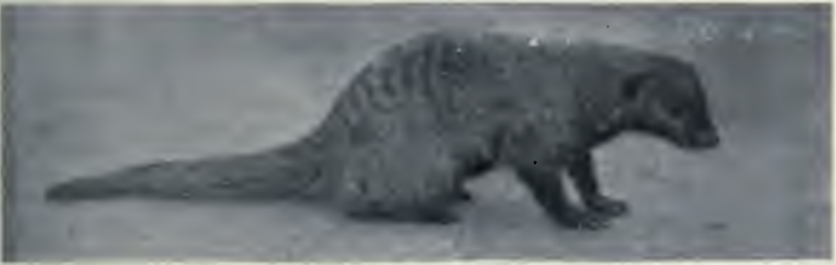

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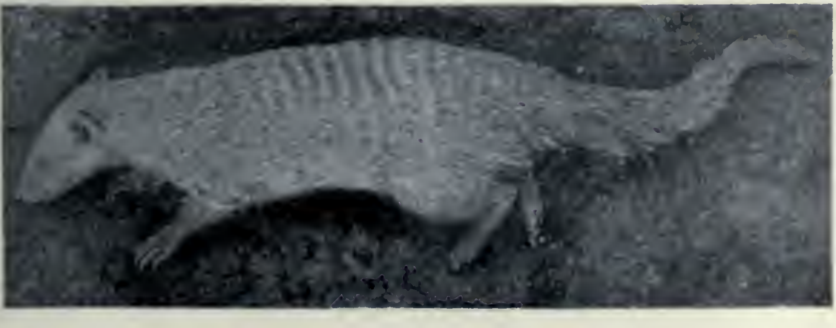

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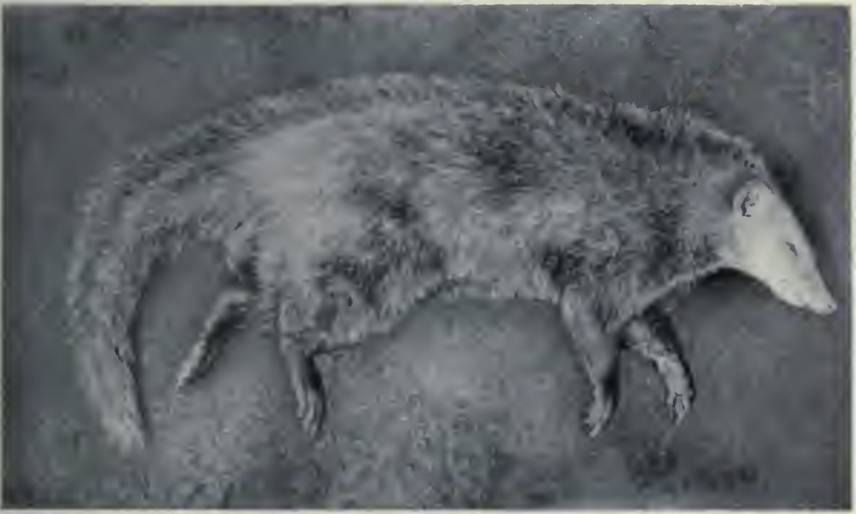
Plate XXV

Figs. 1 and 2. *Crossarchus alexandri* Thomas and Wroughton. Male adult, Amer. Mus. No. 51645, Akenge, September 16, 1913 Total length of animal, 680 mm. Photographs from specimen in the flesh.



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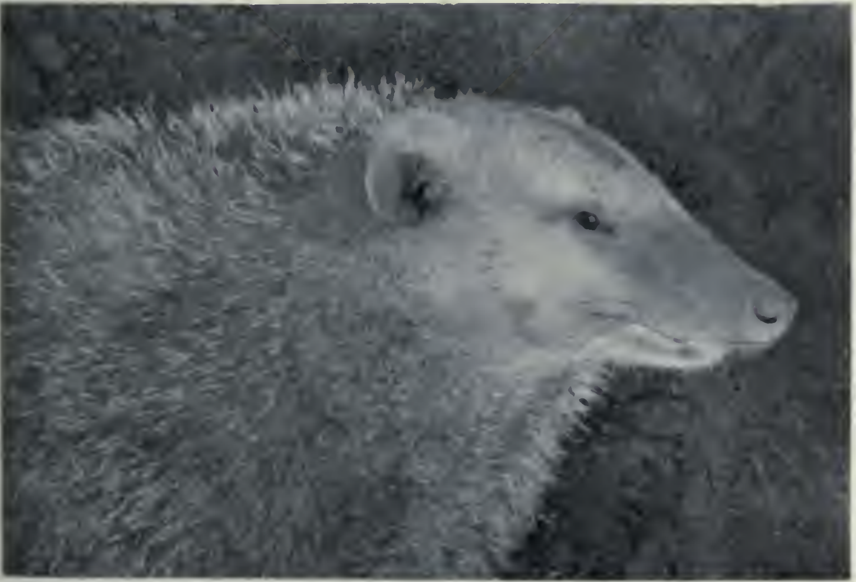

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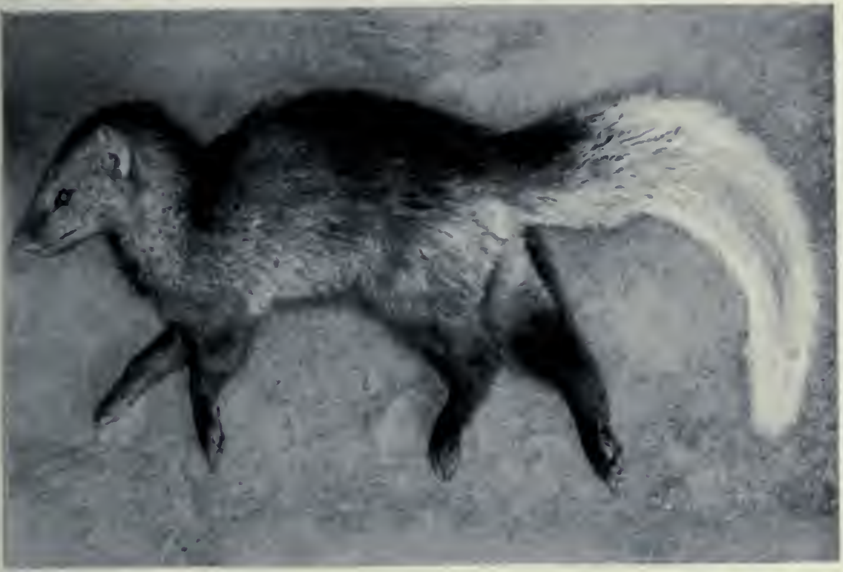
Plate XXVI

Figs. 1 and 2. *Ichneumia leucura ibeana* (Thomas). Male subadult, Amer. Mus. No. 51598. Niangara, April 19, 1913. Total length of animal, 720 mm. Photographs from specimen in the flesh.



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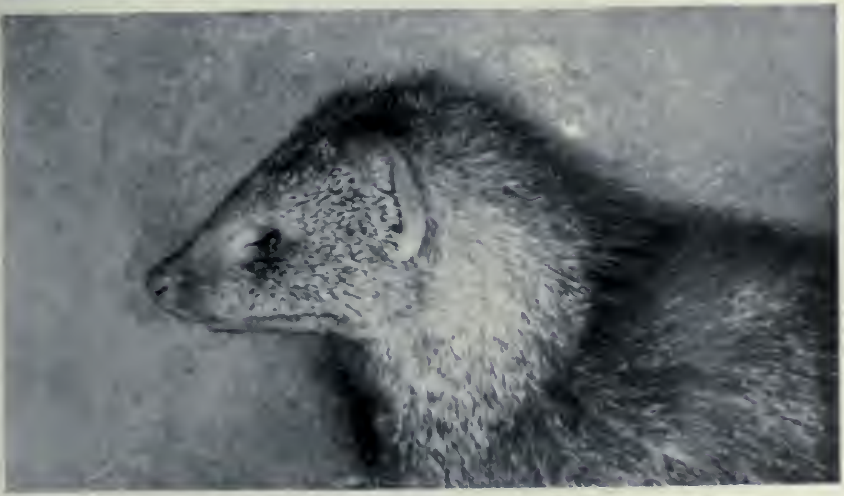

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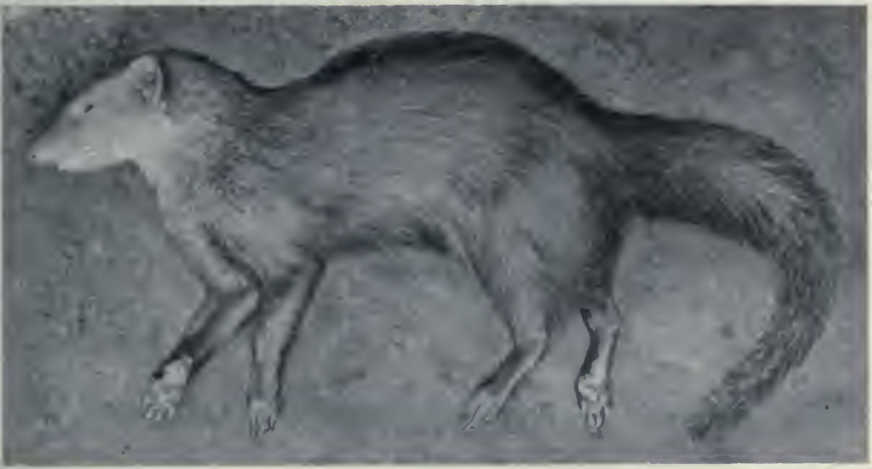
PLATE XXVII

Figs. 1 and 2. *Xenogale microdon* J. A. Allen. Male adult, Amer. Mus. No. 51616, Akenge, October 14, 1913. Photographs from specimen in the flesh.



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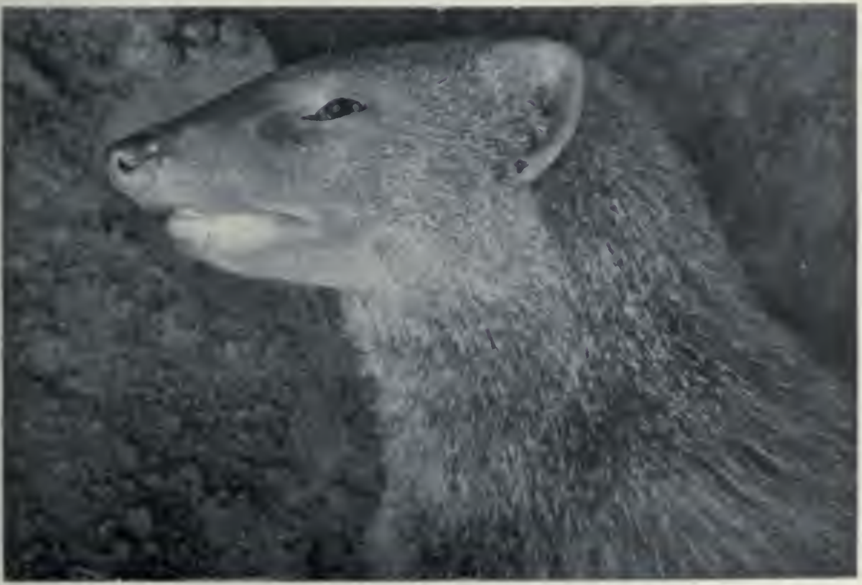

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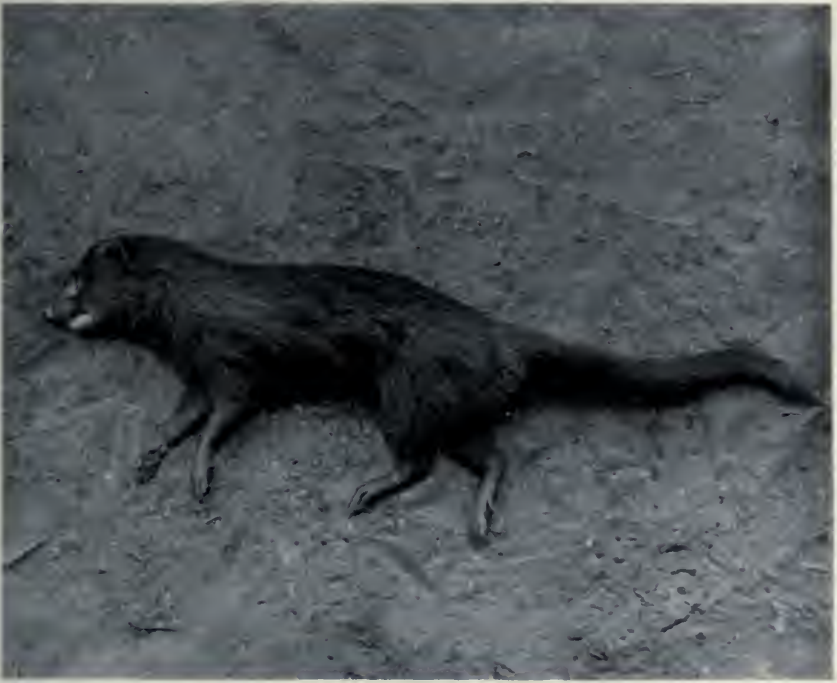
PLATE XXVIII

Fig. 1. *Atilax robustus* Gray. Male adult, Amer. Mus. No. 51612, Faradje, March 8, 1912. Total length of animal, 870 mm.

Fig. 2. *Atilax macrodon*, new species. Male juvenile, Amer. Mus. No. 51615, Medje, October 3, 1910. Total length of animal, 770 mm. Photographs from specimens in the flesh.



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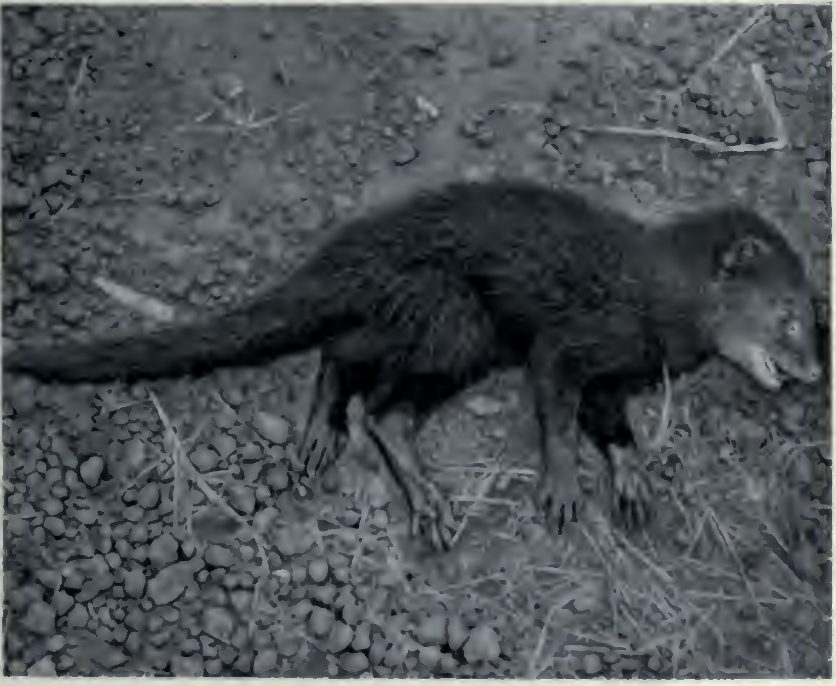

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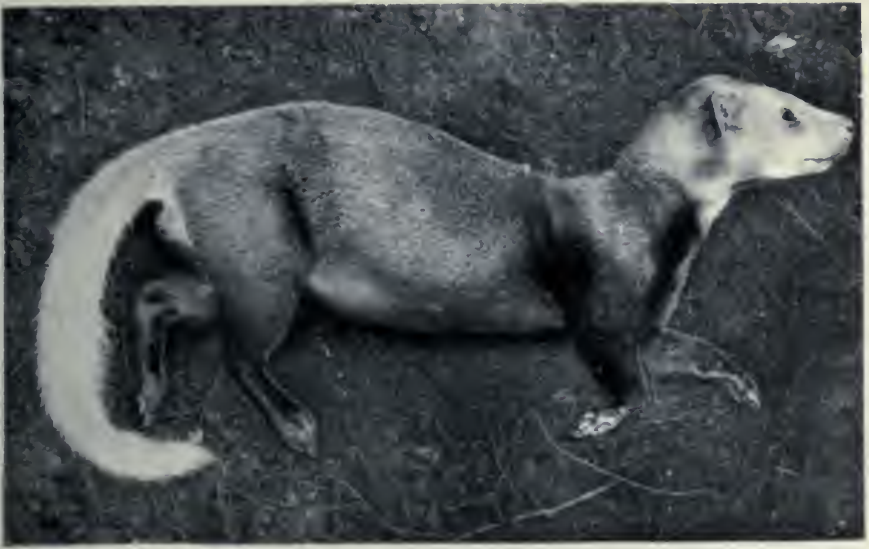
PLATE XXIX

Habitat of *Atilax*. Shore of the Bima River, near Niapu, January 1914

Plate XXX

Fig. 1. *Bdeogale nigripes* Pucheran. Male adult, Amer. Mus. No. 51581, Akenge, October 8, 1913. Total length of animal, 1015 mm.

Fig. 2. *Bdeogale nigripes* Pucheran. Female subadult, Amer. Mus. No. 51580, Akenge, September 30, 1913. Total length of animal, 820 mm. Photographs from specimens in the flesh.



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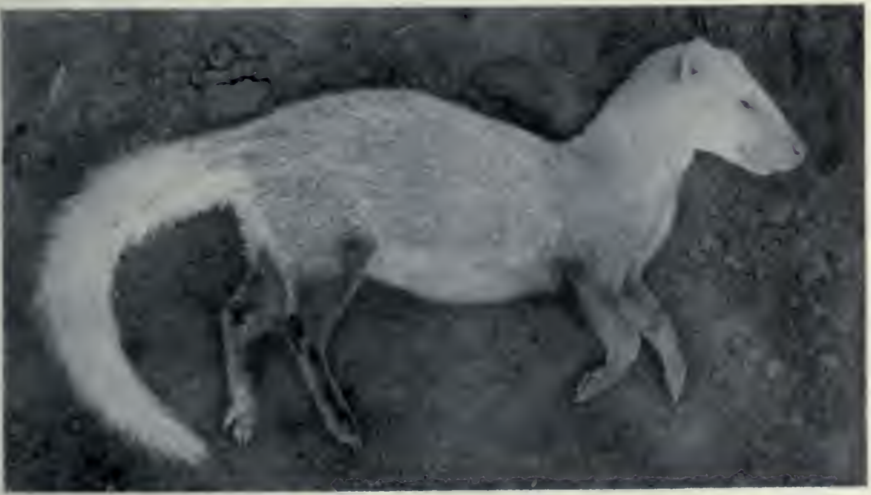

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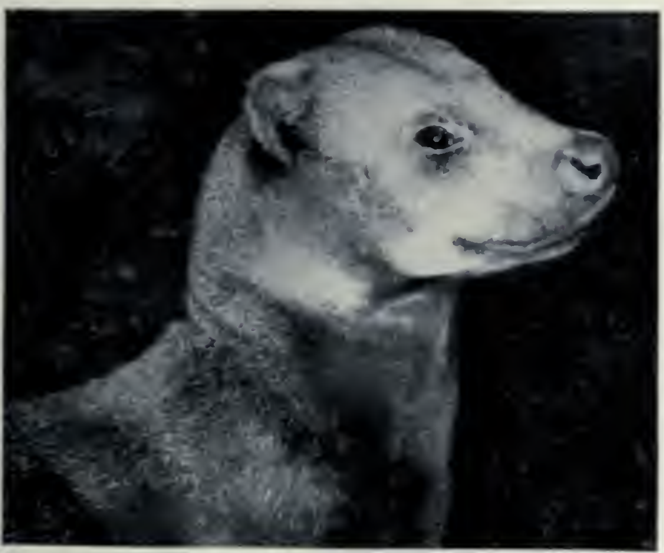
PLATE XXXI

Fig. 1. *Bdeogale nigripes* Pucheran. Male adult, Amer. Mus. No. 51581, Akenge, October 8, 1913. Total length of animal, 1015 mm.

Fig. 2. *Bdeogale nigripes* Pucheran. Female subadult, Amer. Mus. No. 51580, Akenge, September 30, 1913. Total length of animal, 820 mm. Photographs from specimens in the flesh.



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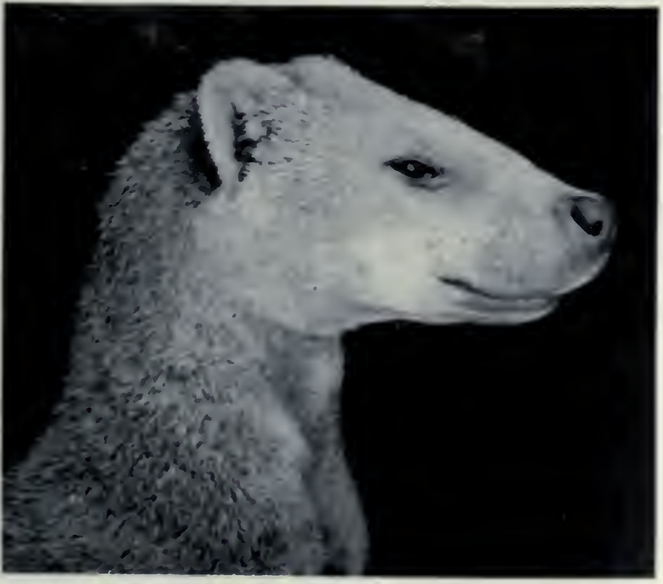

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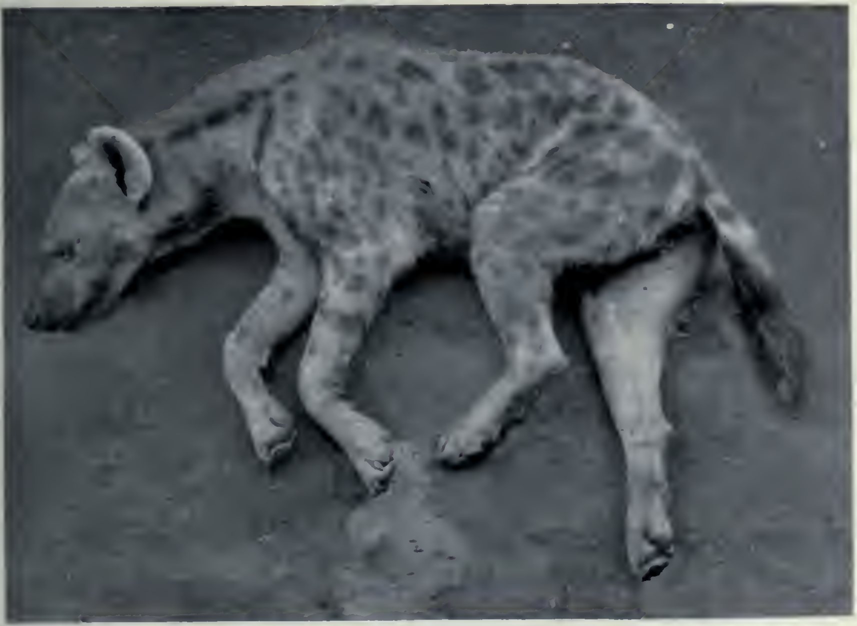
PLATE XXXII

Fig. 1. *Crocuta crocuta fortis*, new subspecies. Female adult, Amer. Mus. No. 52064, Faradje, February 20, 1912. Total length of animal, 1720 mm.

Fig. 2. *Crocuta crocuta fortis*, new subspecies. Male juvenile, Amer. Mus. No. 52062, Faradje, September 12, 1911. Total length of animal, 1398 mm. Photographs from specimens in the flesh.



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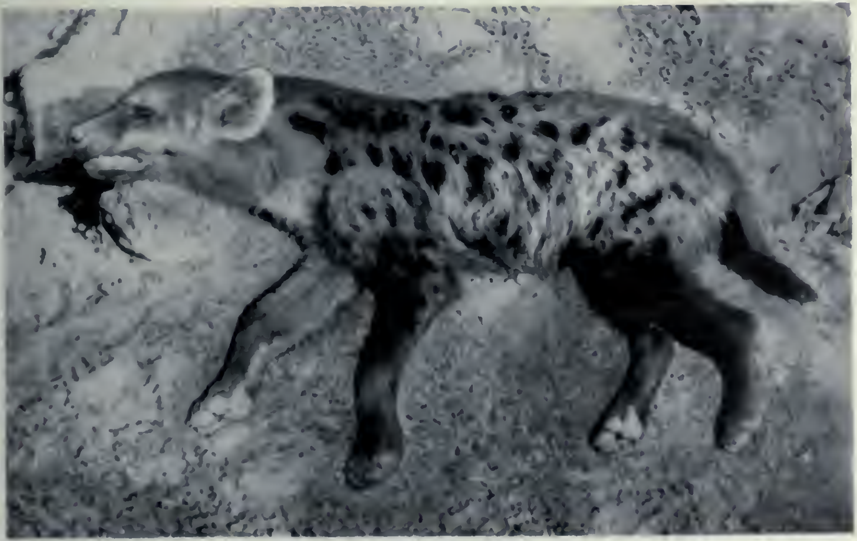

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Plate XXXIII

Crocuta crocuta fortis, new subspecies. Type skull, female adult, Amer. Mus. No. 52068, Faradje, February 5, 1913. Palatal view to show posterior border of palate and auditory bullæ. One-half natural size.

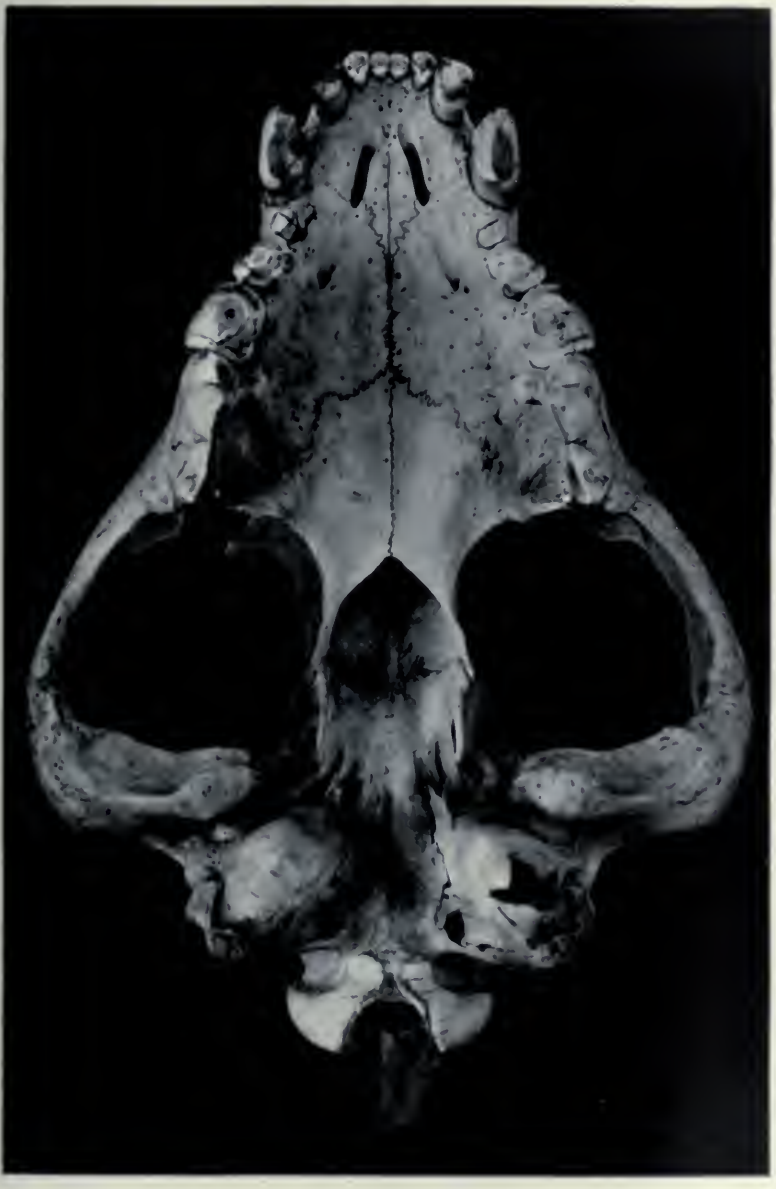
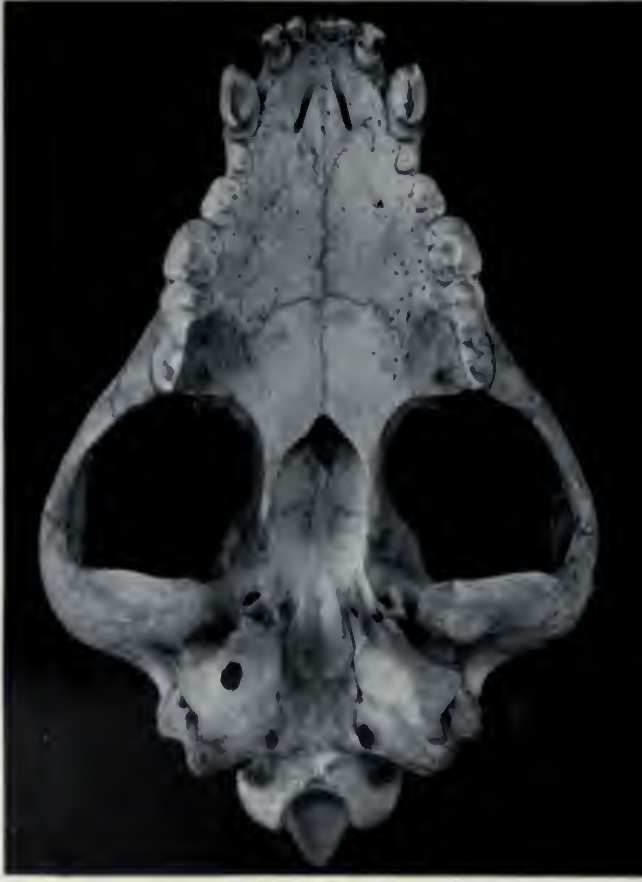


PLATE XXXIV

Showing varying position of second upper premolar in *Crocuta crocuta fortis*, new subspecies. About two-fifths natural size.

Fig. 1. Male adult, Amer. Mus. No. 52059, Faradje, August 24, 1911.

Fig. 2. Adult, Amer. Mus. No. 52065, Faradje, February 20, 1912.



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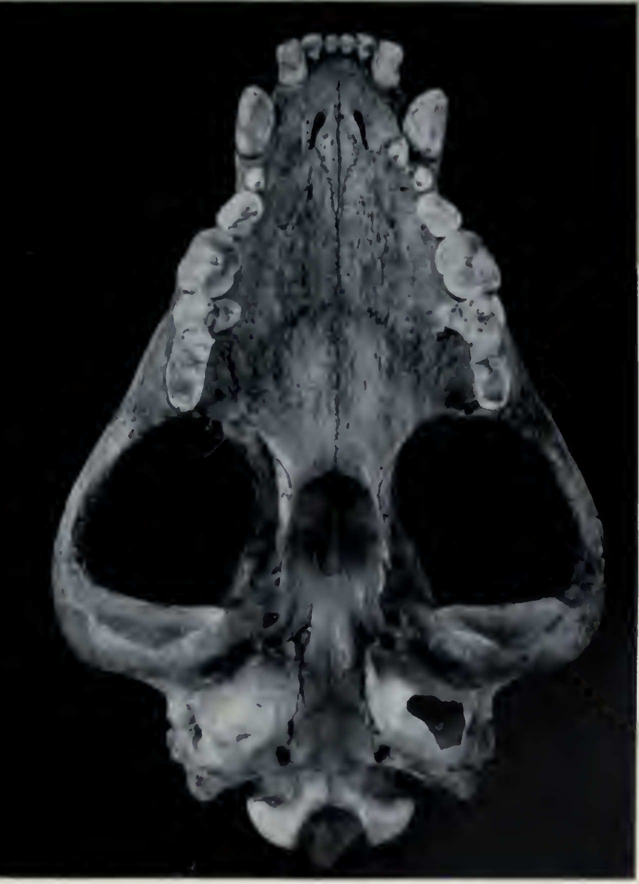

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PLATE XXXV

Comparative views of right auditory bulla in *Crocuta crocuta fortis*, new subspecies, and *C. c. germinans* (Matschie).

Fig. 1. *Crocuta c. fortis*. Type. Female adult, Amer. Mus. No. 52068, Faradje, February 5, 1913.

Fig. 2. *Crocuta c. germinans*. Female adult, U. S. Nat. Mus. No. 181522, Kabalolot Hill, Sotik, British East Africa.

Fig. 3. *Crocuta c. fortis*. Adult, Amer. Mus. No. 52065, Faradje, February 20, 1912.

Fig. 4. *Crocuta c. germinans*. Amer. Mus. No. 36389, near Lake Naivasha, British East Africa.

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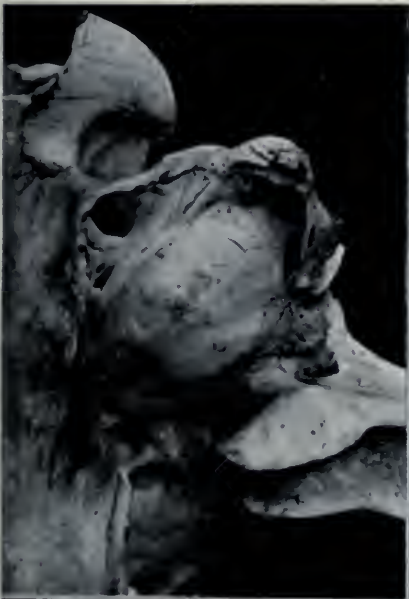

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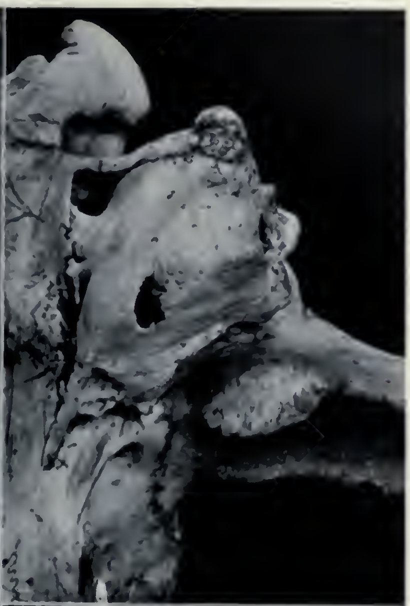

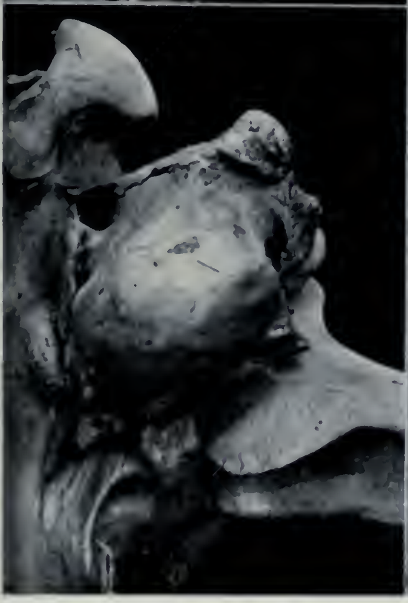

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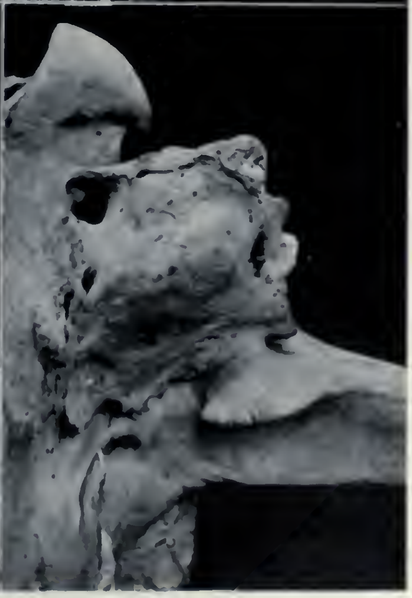

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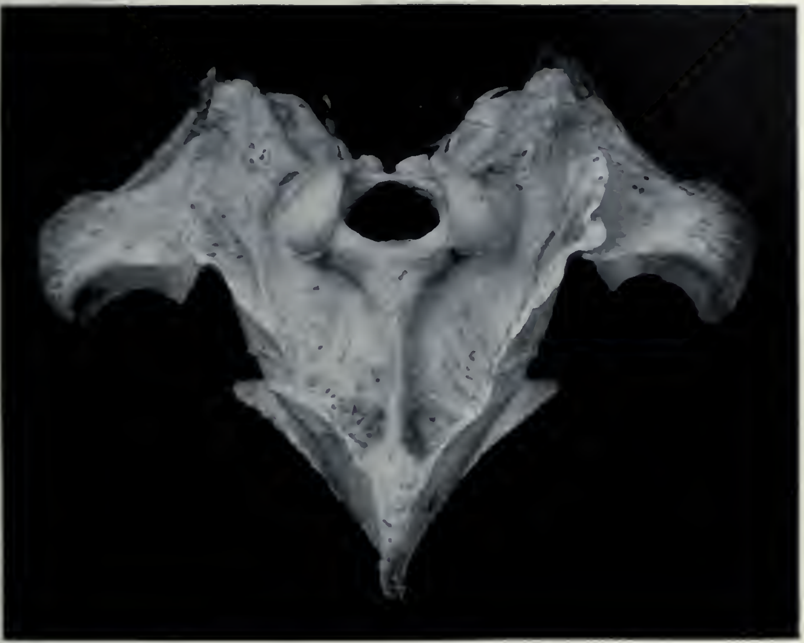
PLATE XXXVI

Comparative views of braincase in *Crocuta crocuta fortis*, new subspecies and *C. c. germinans* (Matschie). About one-half natural size.

Fig. 1. *Crocuta c. fortis*. Type skull. Female adult, Amer. Mus. No. 52068, Faradje, February 5, 1913.

Fig. 2. *Crocuta c. germinans*. Female adult, U. S. Nat. Mus. No. 181522, Kabalolot Hill, Sotik, British East Africa.

Both skulls are of old females typically representing series of the two forms.



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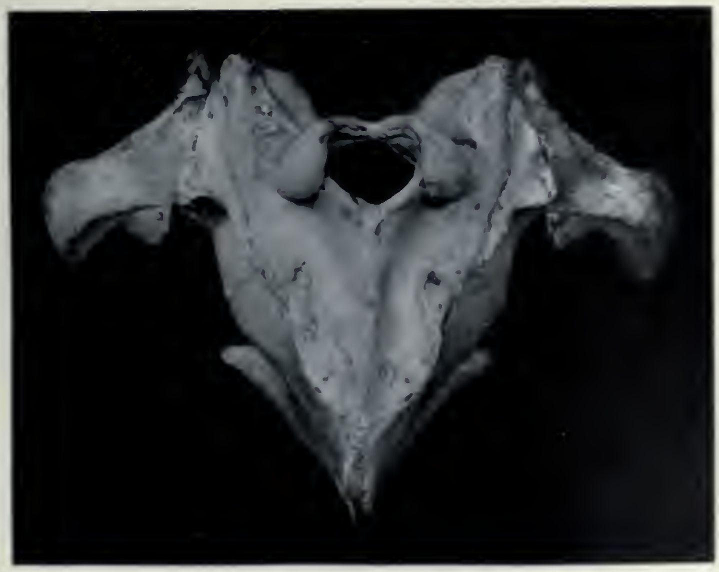

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PLATE XXXVII

Leo leo azandicus, new subspecies. Type. Male adult, Amer. Mus. No. 52084. Vankerckhovenville, April 18, 1912. Total length of animal, 2860 mm. Photograph from specimen in the flesh.

PLATE XXXVIII

Fig. 1. *Leo leo azandicus*, new subspecies. Male adult, Amer. Mus. No. 52077, Faradje, January 5, 1912. Total length of animal, 2730 mm.

Fig. 2. *Leo leo azandicus*, new subspecies. Female adult, Amer. Mus. No. 52073, Faradje, June 6, 1911. Total length of animal, 2240 mm. Photographs from specimens in the flesh.

1

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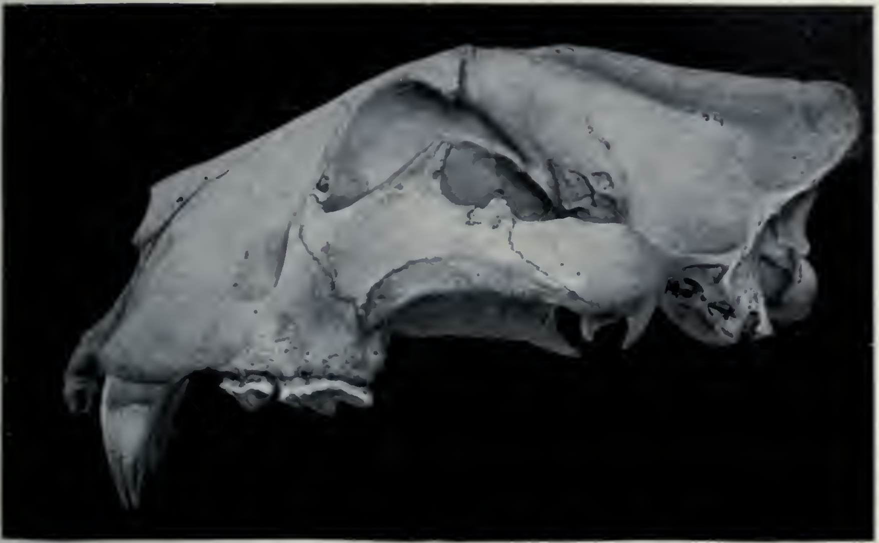
PLATE XXXIX

Figs. 1 and 2. *Leo leo azandicus*, new subspecies. Type skull. Male adult, Amer. Mus. No. 52084, Vankerckhovenville, April 18, 1912. About one-third natural size.



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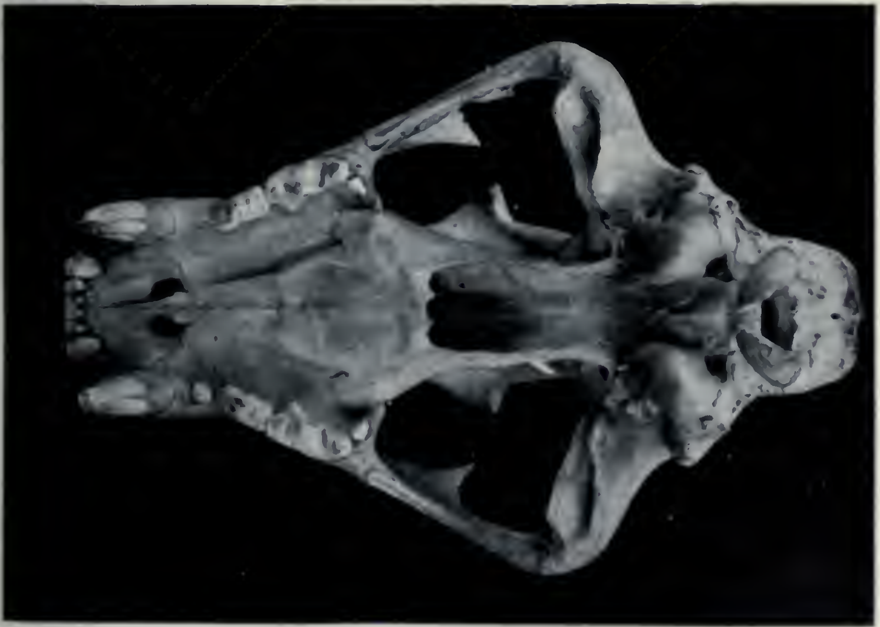

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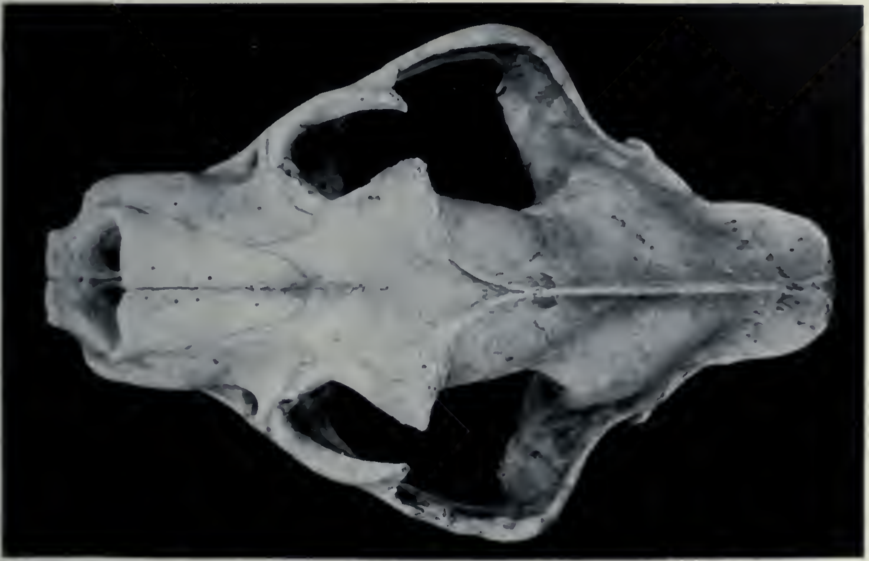
PLATE XL

Figs. 1 and 2. *Leo leo azandicus*, new subspecies. Type skull. Male adult, Amer. Mus. No. 52084, Vankerckhovenville, April 18, 1912. About one-third natural size.



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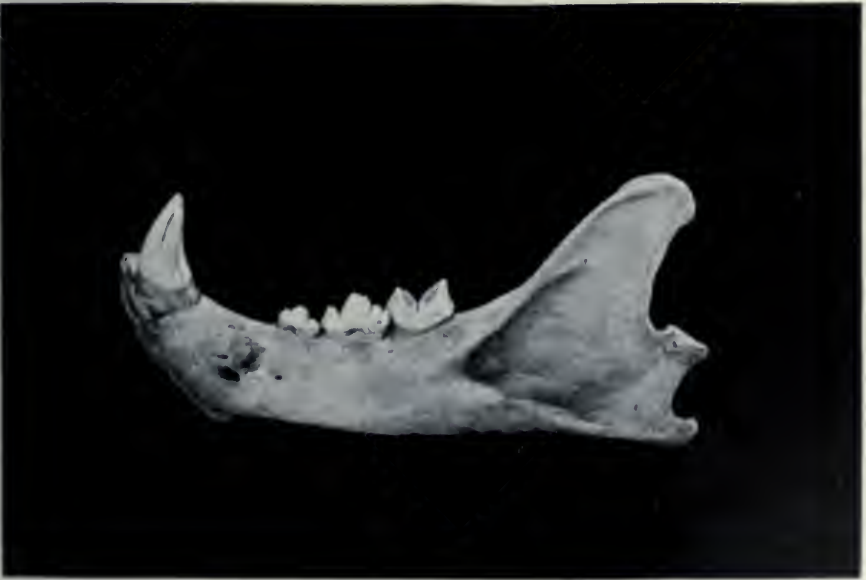

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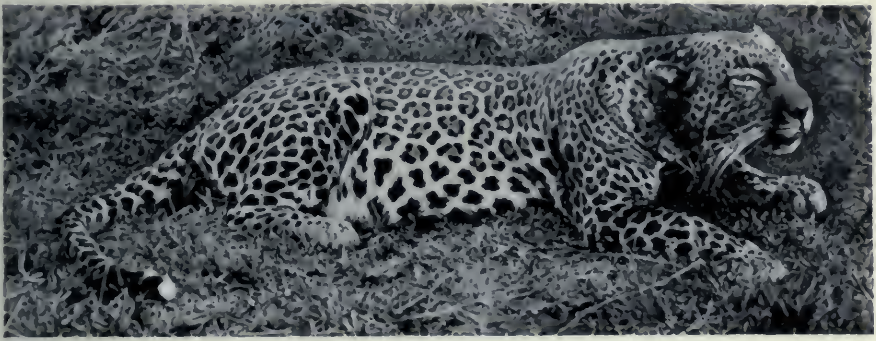
PLATE XLI

Fig. 1. *Panthera pardus chui* (Heller). Between N'Zoia and Elgon, 1914. Photograph of specimen in the flesh, by L. Bayer.

Fig. 2. *Panthera pardus chui* (Heller). Male adult, Amer. Mus. No. 52006, Faradje, March 28, 1911. Total length of animal, 2120 mm. Photograph of specimen in the flesh.

Fig. 3 *Panthera pardus iturensis*, new subspecies. Male adult, Amer. Mus. No. 52043, Gamangui, February 6, 1910. Total length of animal, 2100 mm. Photograph of specimen in the flesh.



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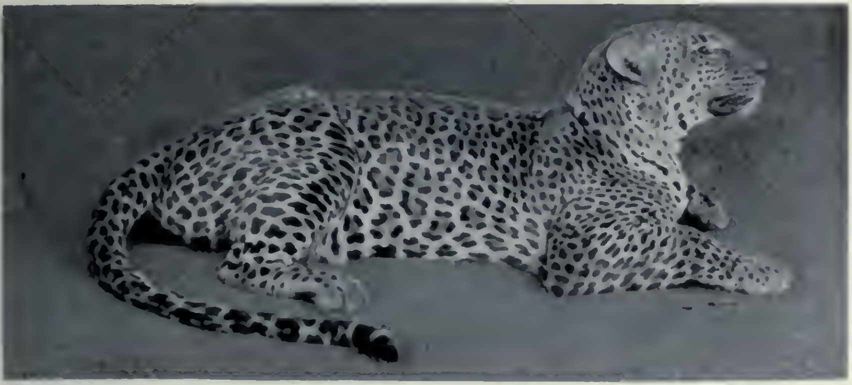

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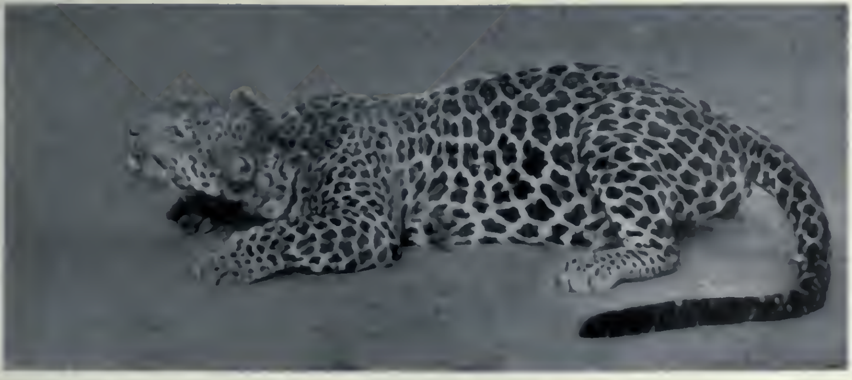

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Plate XLII

Panthera pardus suahelica (Neumann). Amer. Mus. No. 36428, British East Africa. Paul J. Rainey Collection.

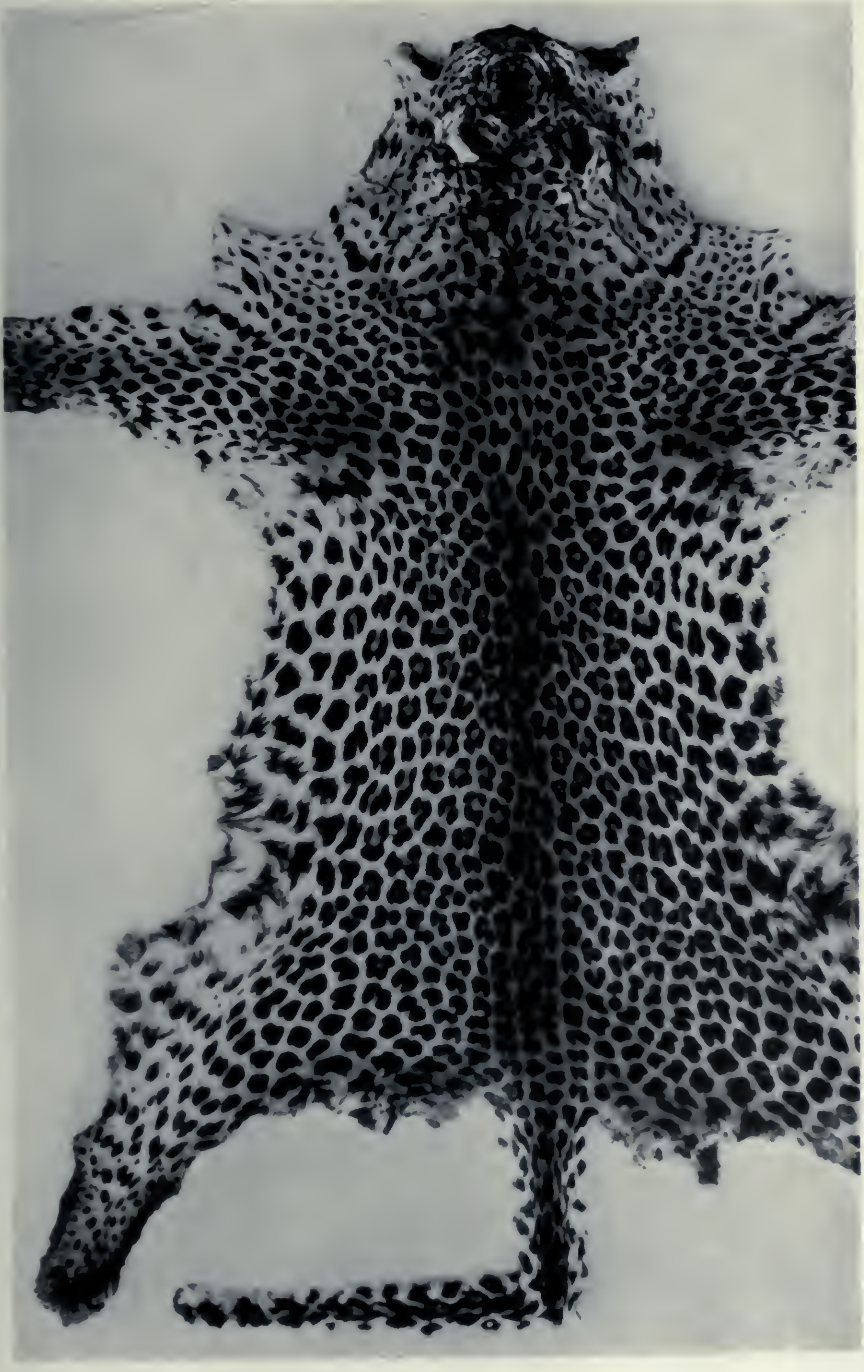


PLATE XLIII

Panthera pardus suahelica (Neumann). Amer. Mus. No. 36429, British East Africa. Paul J. Rainey Collection.

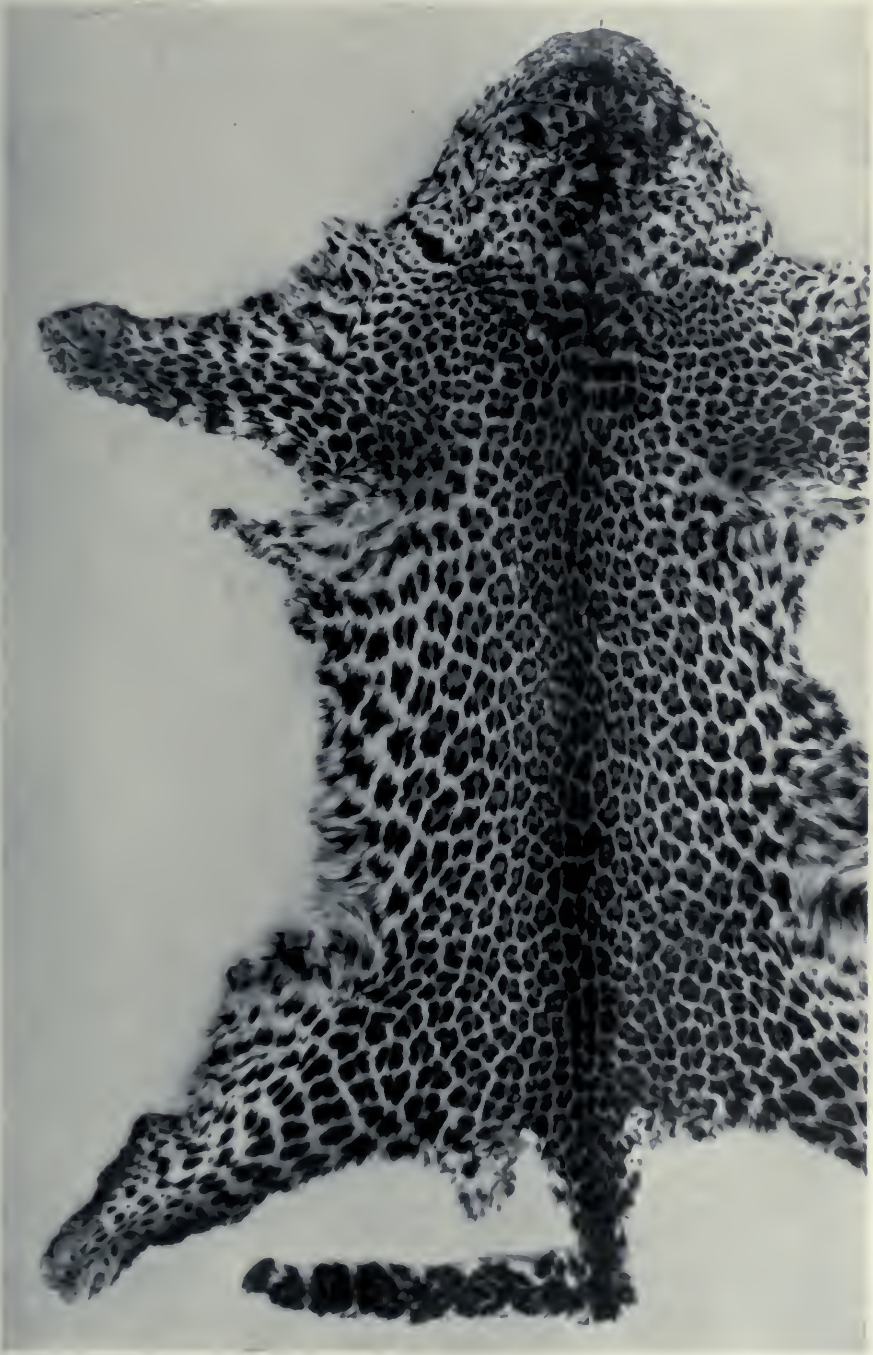


PLATE XLIV

Panthera pardus chui (Heller). Male adult, Amer. Mus. No. 52006, Faradje, March 28, 1911. Total length of animal, 2120 mm.

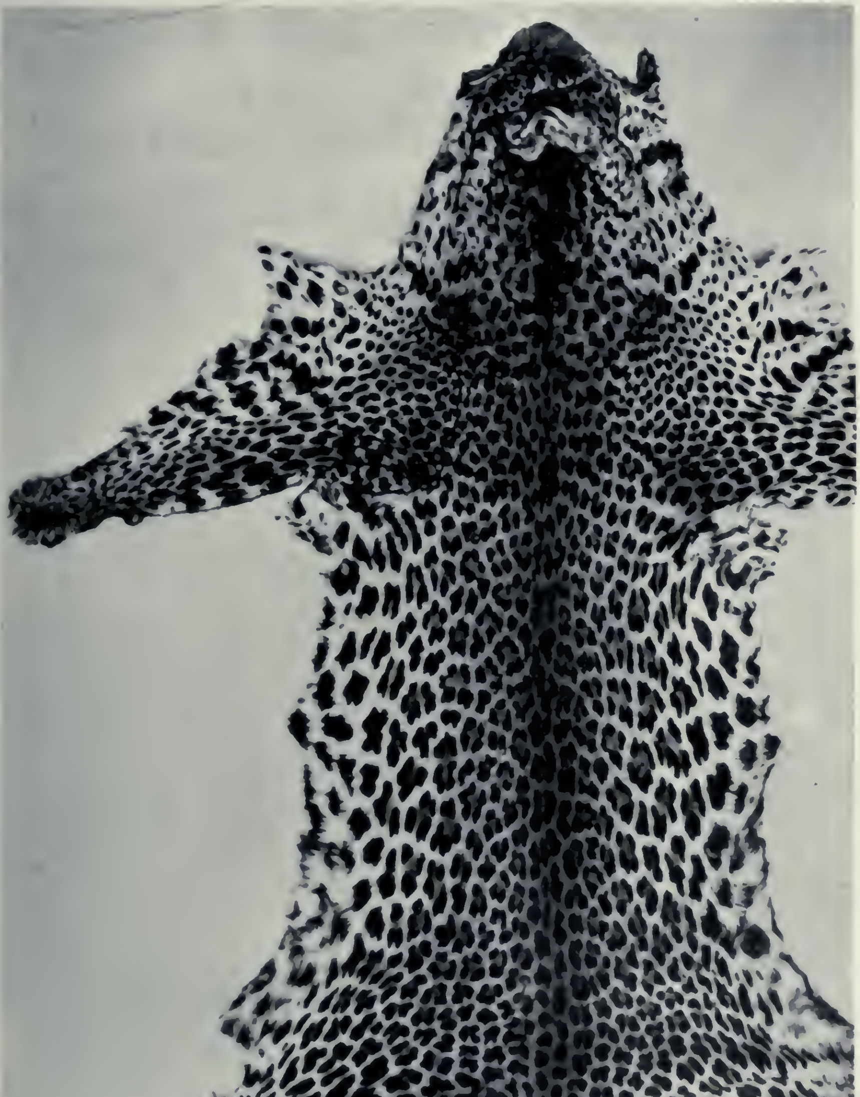


PLATE XLV

Panthera pardus chui (Heller). Male adult, Amer. Mus. No. 52012, Faradje, May 27, 1911. Total length of animal, 2090 mm.

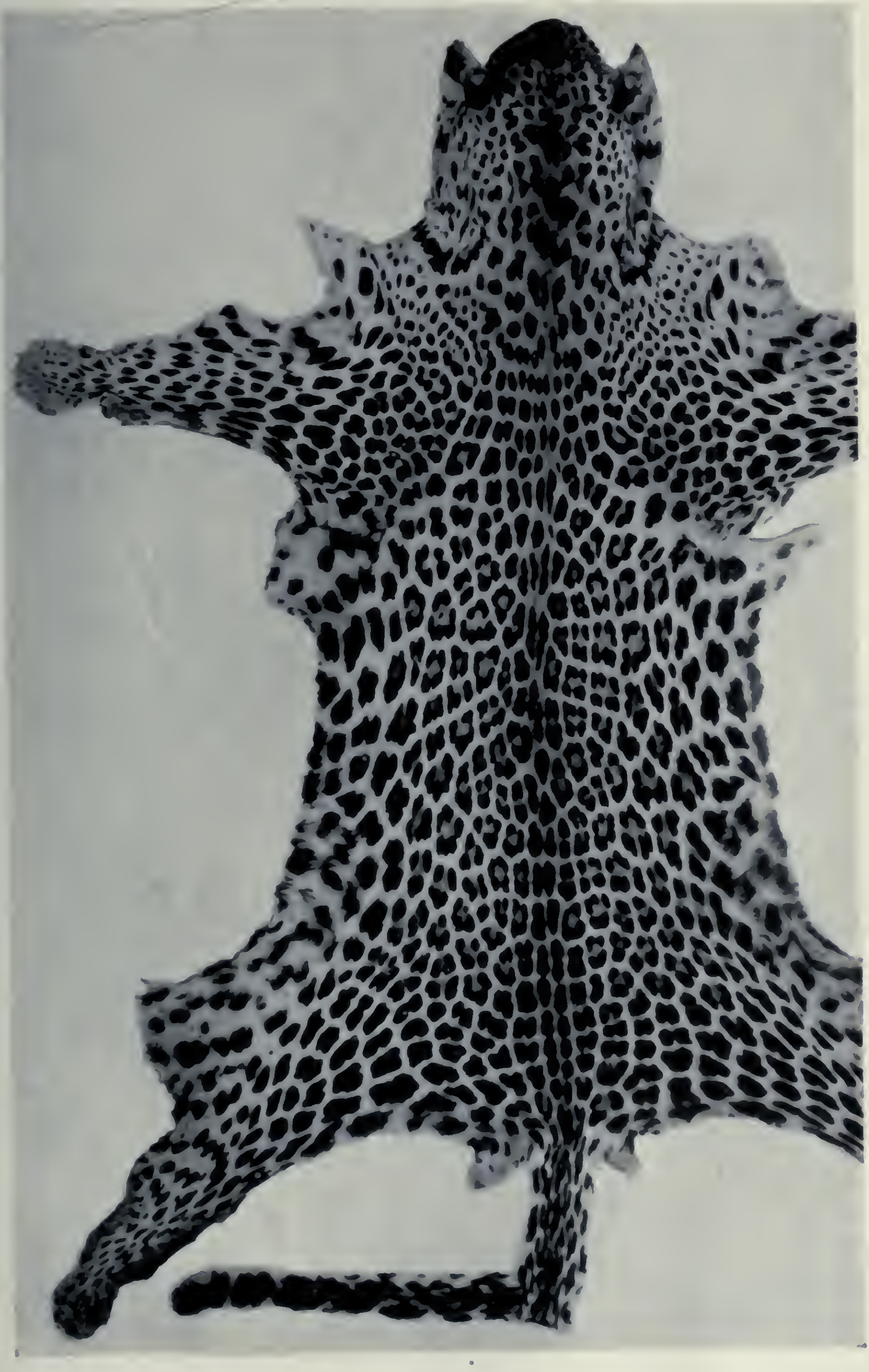


PLATE XLVI

Panthera pardus chui (Heller). Male adult, Amer. Mus. No. 52019, Faradje, August 8, 1912. Total length of animal, 1810 mm.

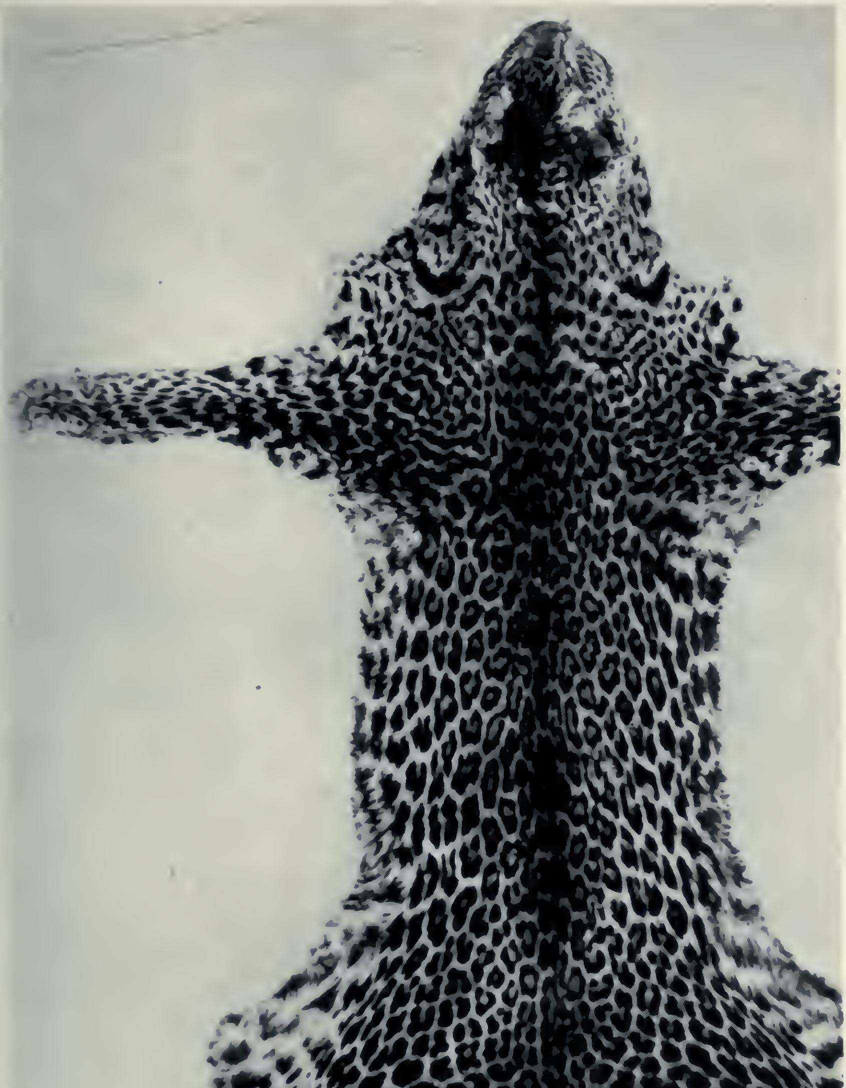


PLATE XLVII

Panthera pardus chui (Heller). Male adult, Amer. Mus. No. 52023, Faradje, February 17, 1913. Total length of animal, 2030 mm.

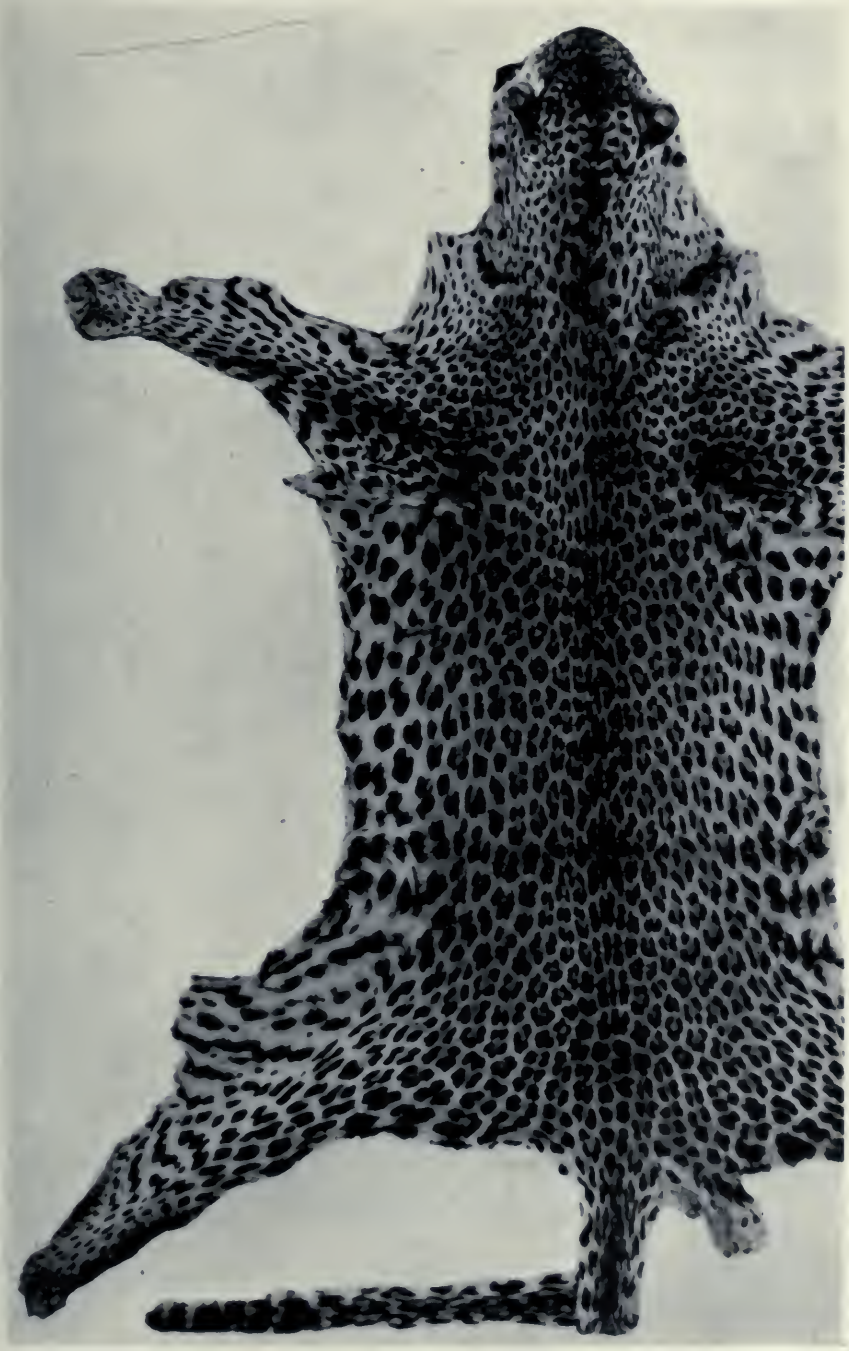


PLATE XLVIII

Panthera pardus chui (Heller). Female adult, Amer. Mus. No. 52005, Faradje. March 26, 1911. Total length of animal, 1819 mm.

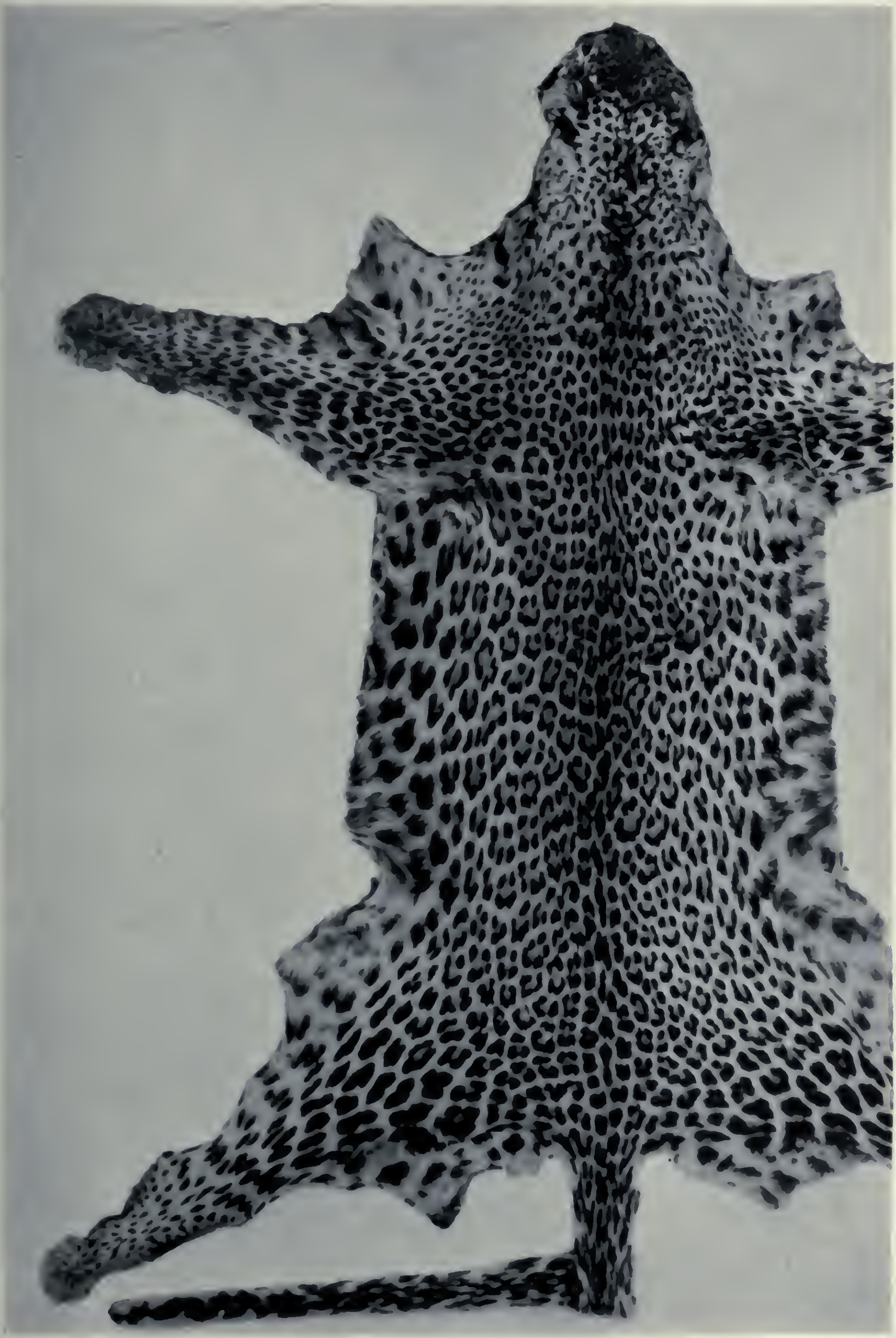


PLATE XLIX

Panthera pardus chui (Heller). Amer. Mus. No. 52002, Faradje, March 1, 1911.

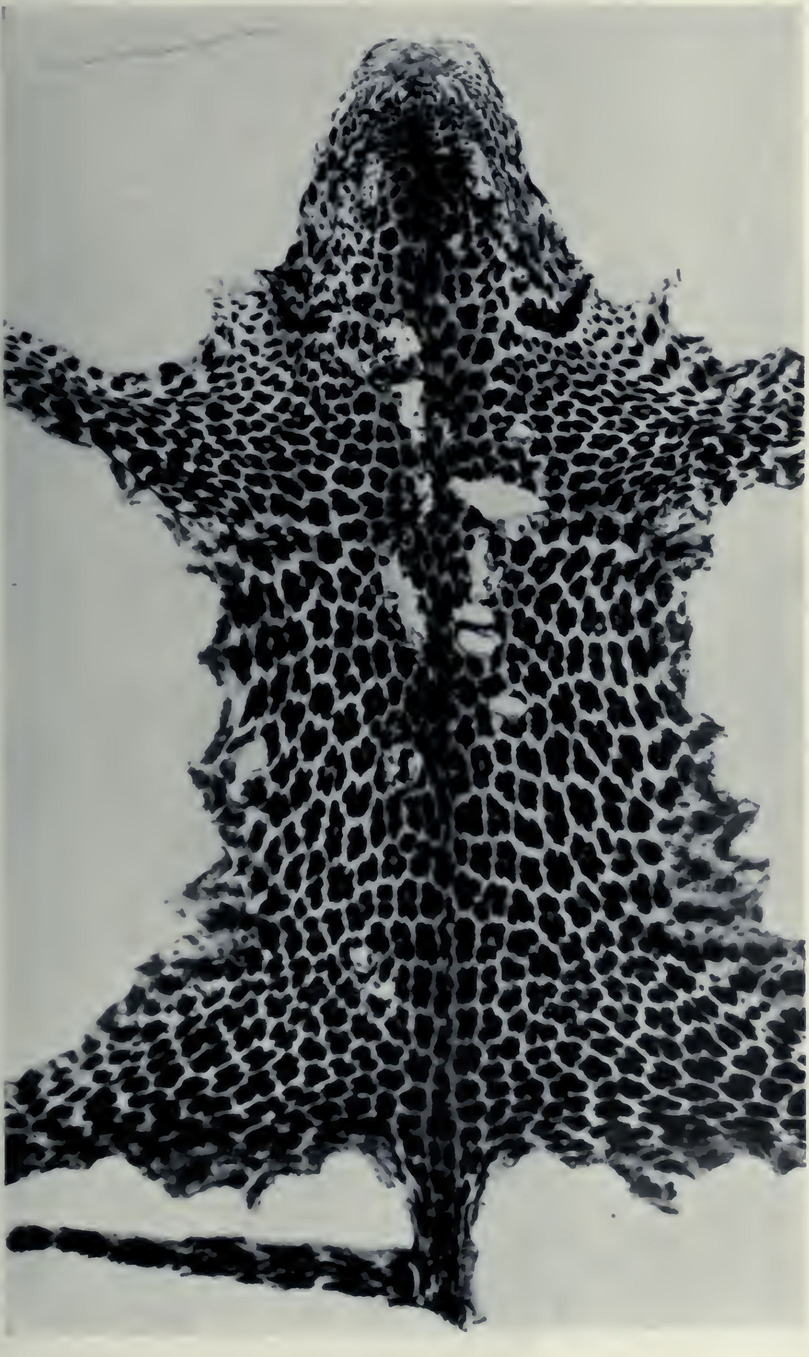


Plate L

Panthera pardus chui (Heller). Amer. Mus. No. 52003, Faradje, March 1, 1911.

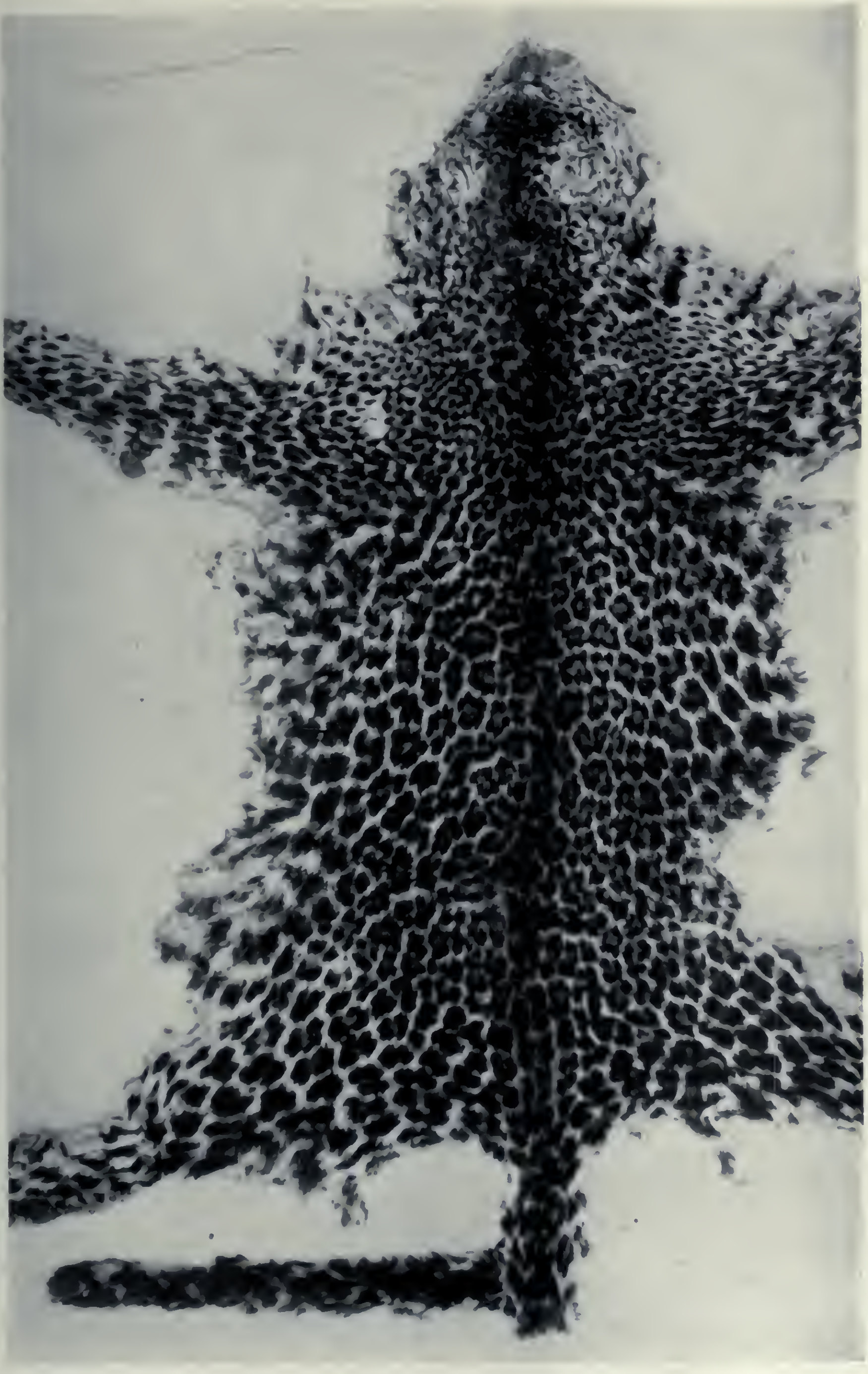


PLATE LI

Panthera pardus chui (Heller). Amer. Mus. No. 52014, Faradje, June 9, 1911.

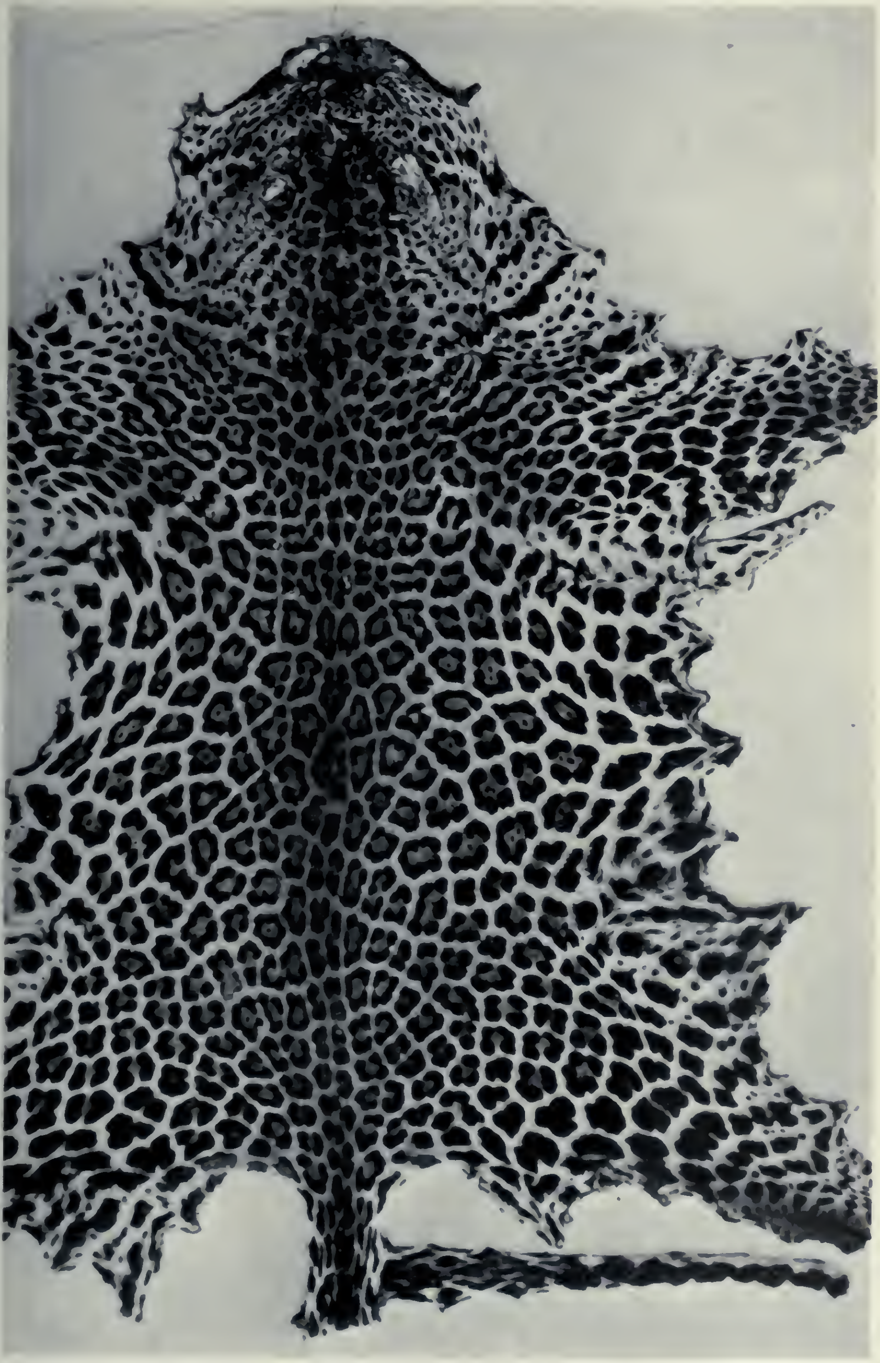


PLATE LII

Panthera pardus chui (Heller). Adult male, Amer. Mus. No. 34747, Elgeyo Forest, British East Africa, at 6000 feet, January 23, 1913. Total length of animal, 1582 mm. Rainsford Collection.

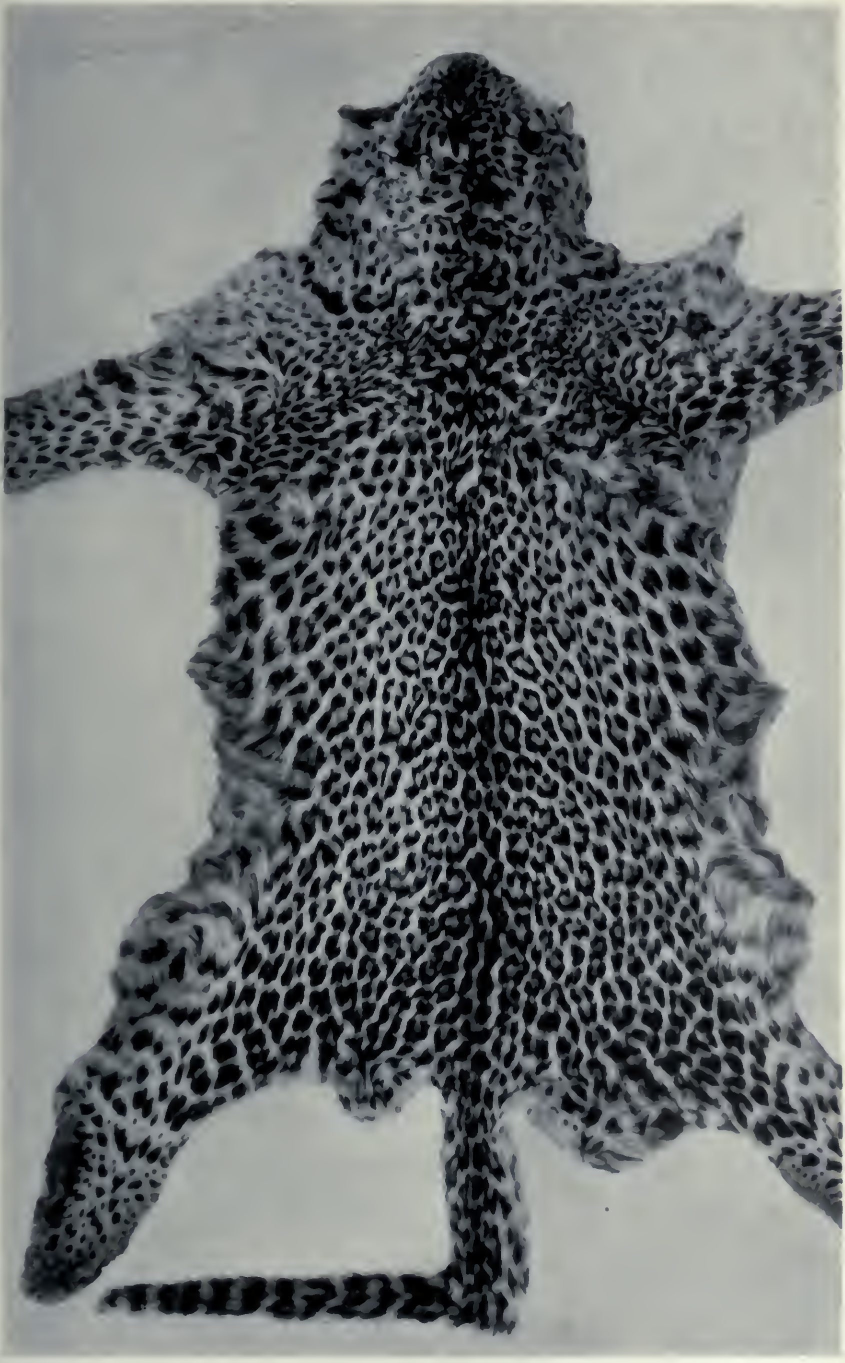


PLATE LIII

Panthera pardus chui (Heller). Female juvenile, Amer. Mus. No. 52001, Faradje, February 8, 1911. Total length of animal, 635 mm.

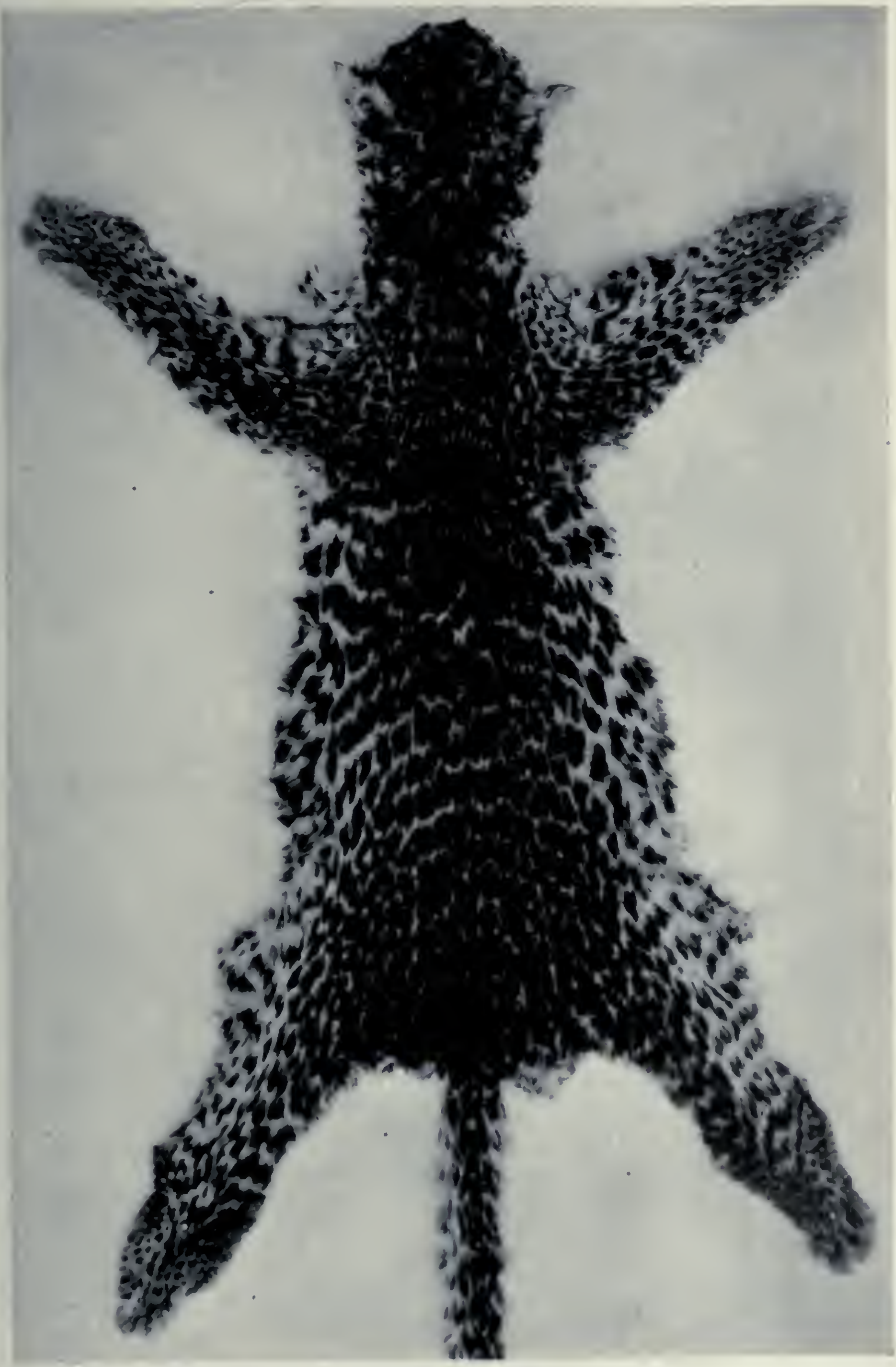


PLATE LIV

Panthera pardus chui (Heller). Female juvenile, Amer. Mus. No. 51070, Faradje, February 20, 1912. Total length of animal, 480 mm.

PLATE LV

Panthera pardus iturensis, new subspecies. Male adult, Amer. Mus. No. 52043, Gamangui, February 6, 1910. Total length of animal, 2100 mm.

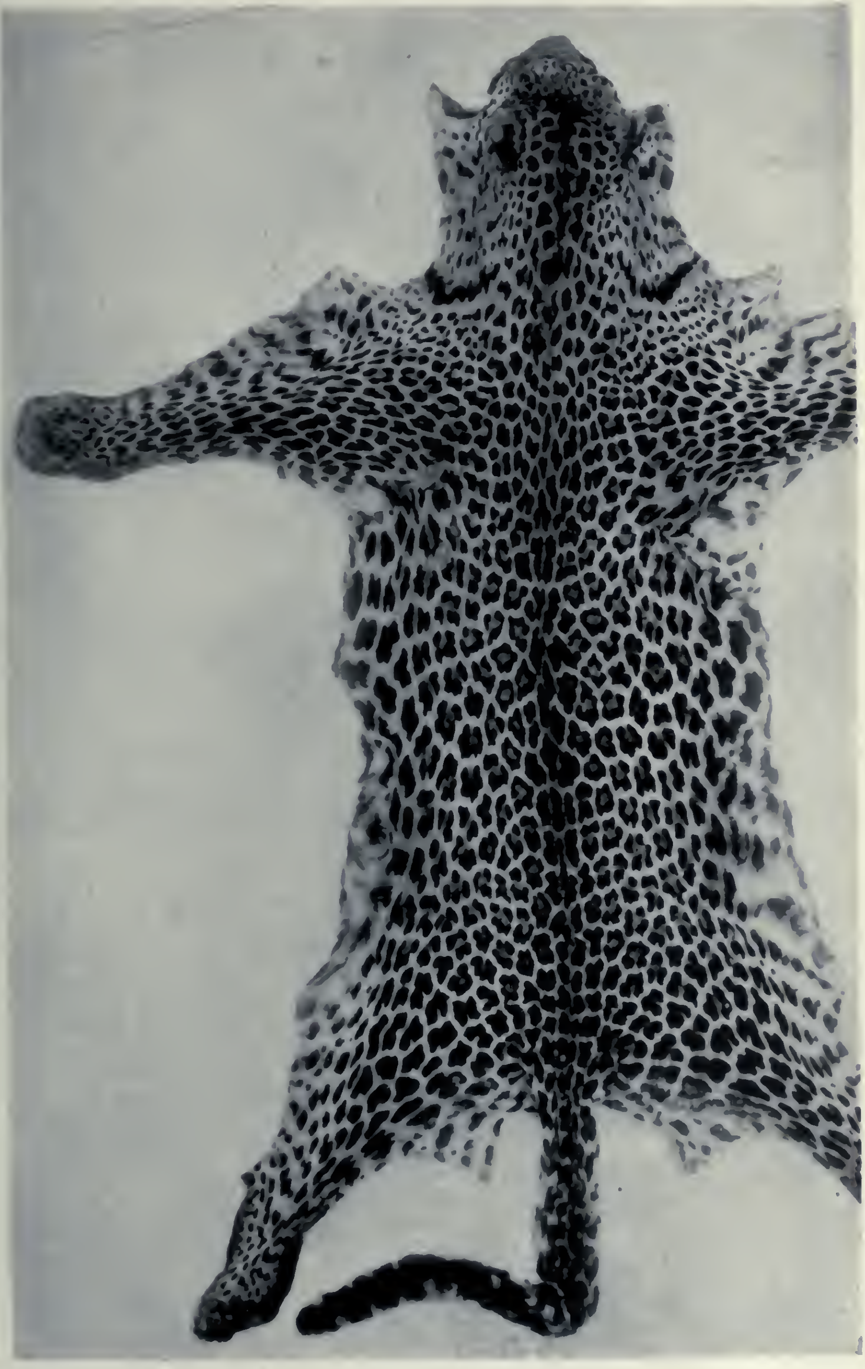


PLATE LVI

Panthera pardus iturensis, new subspecies. Male adult, Amer. Mus. No. 52032, Medje, June 16, 1914.

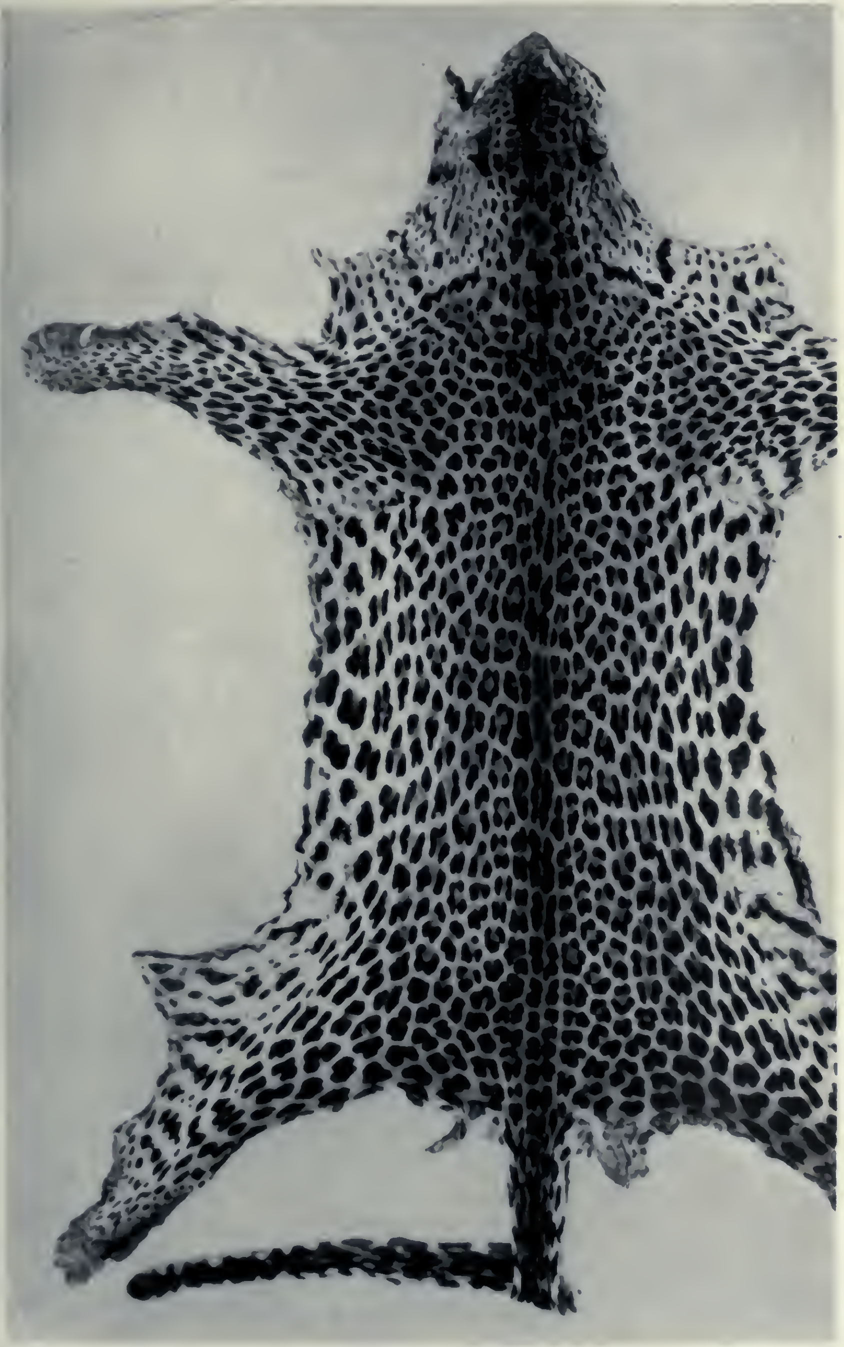


PLATE LVII

Panthera pardus iturensis, new subspecies. Female adult, Amer. Mus. No. 52026, Niapu, December 16, 1913. Total length of animal, 1790 mm.

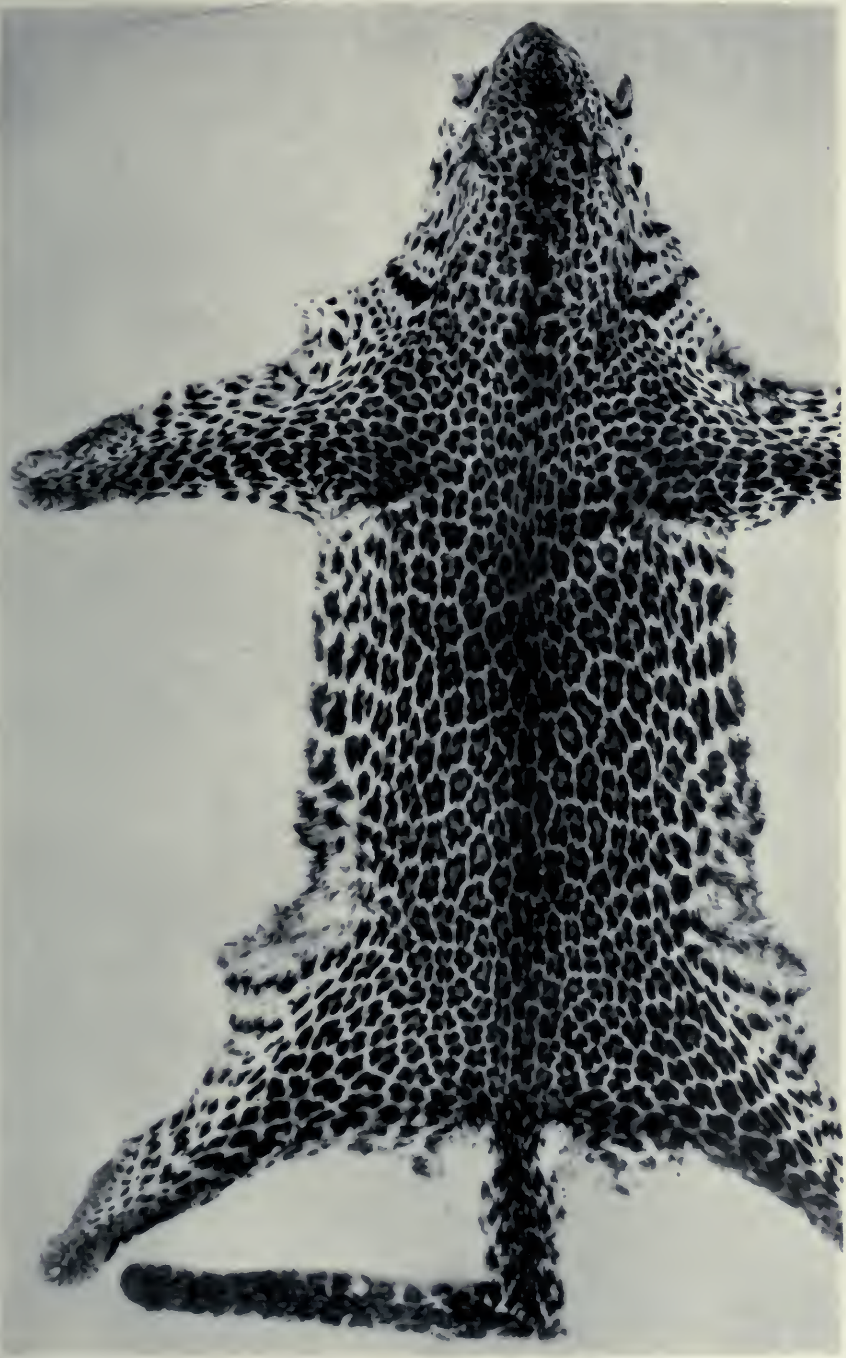


PLATE LVIII

Panthera pardus iturensis, new subspecies. Male adult, Amer. Mus. No. 52027, Niapu, December 26, 1913.

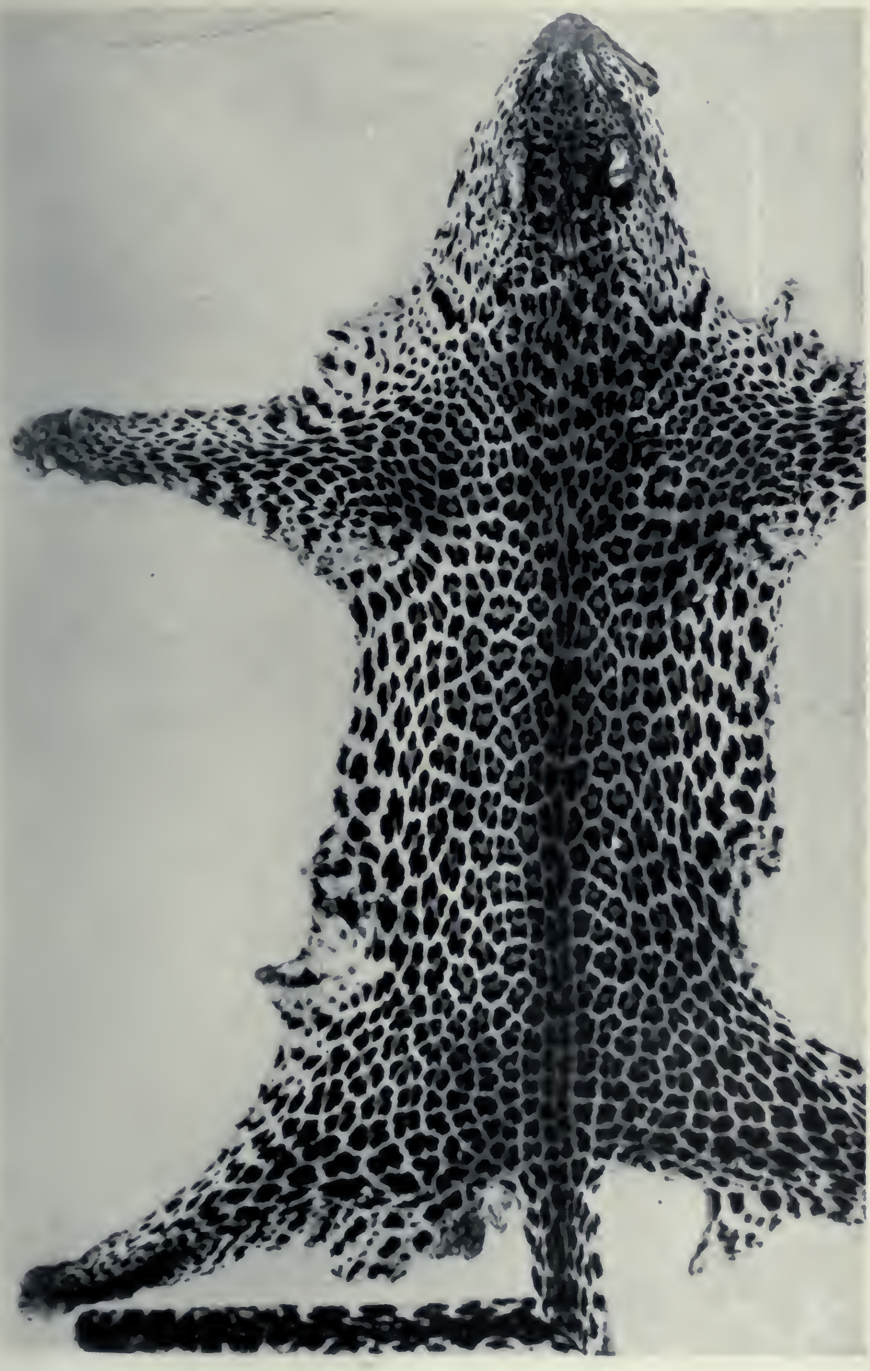


PLATE LIX

Panthera pardus iturensis, new subspecies. Male adult, Amer. Mus. No. 52031, Niapu. February 11, 1914. Total length of animal, 2000 mm.

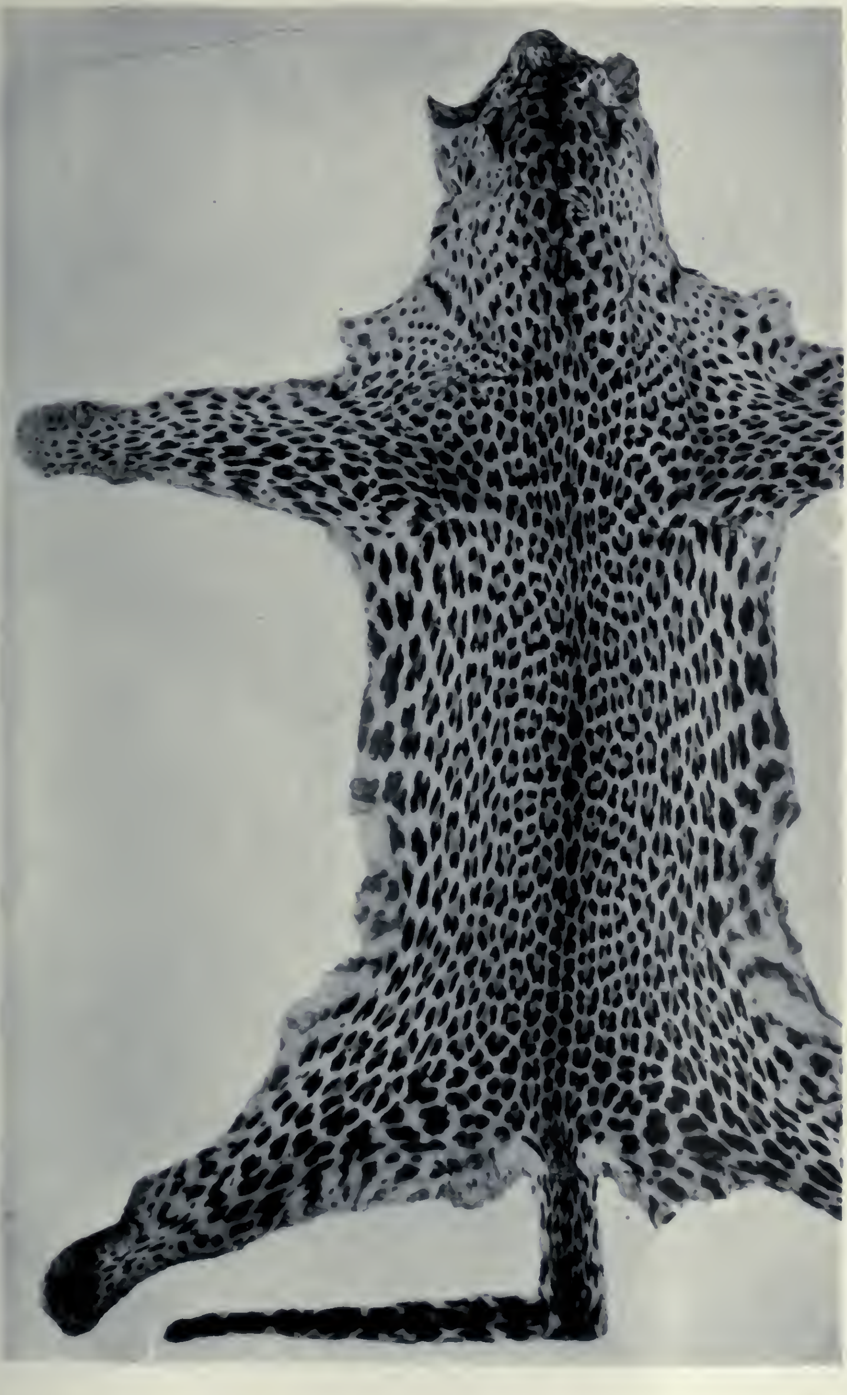


PLATE LX

Panthera pardus iturensis, new subspecies. Female adult, Amer. Mus. No. 52030, Niapu, January 8, 1914.

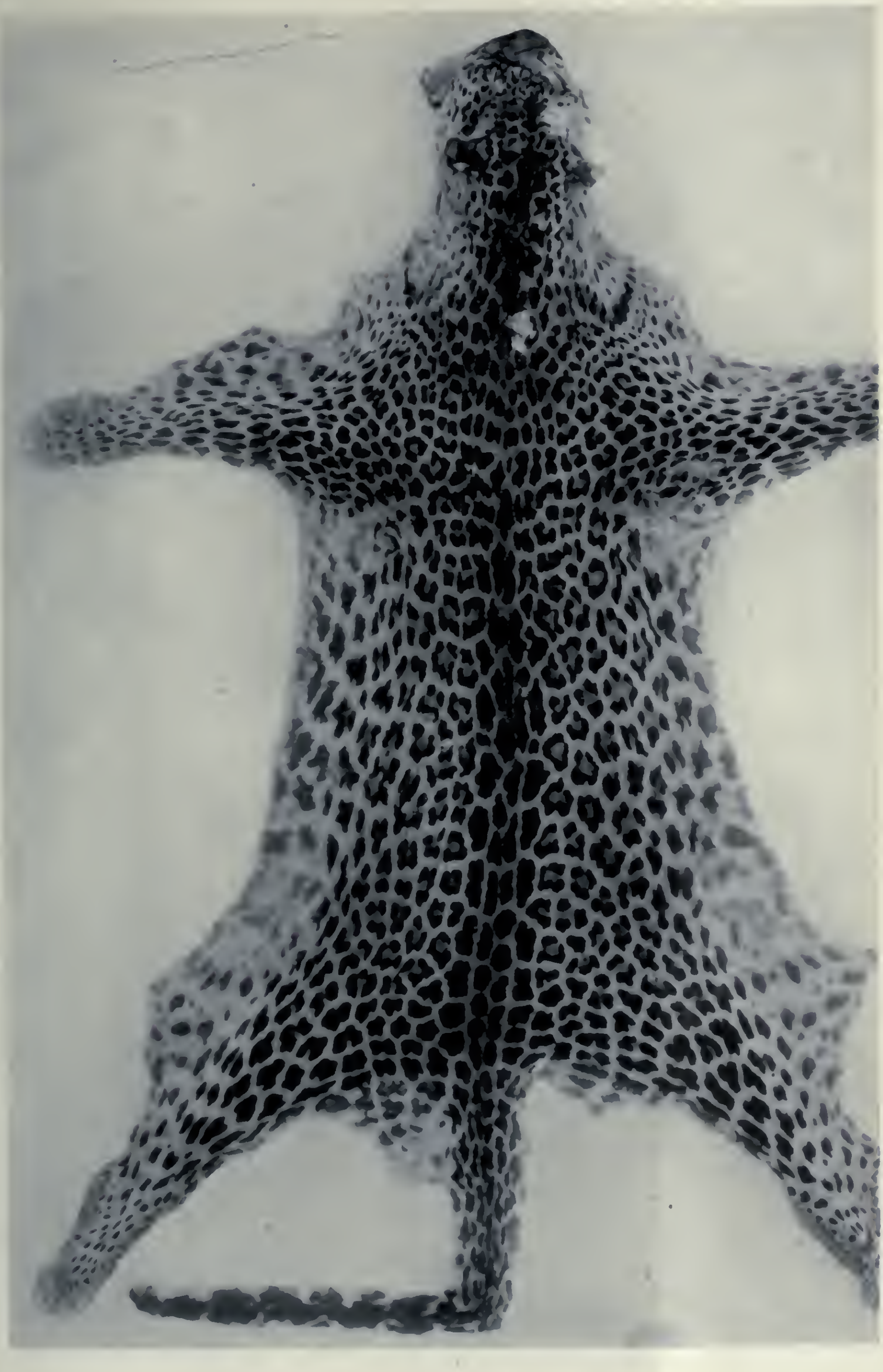


PLATE LXI

Panthera pardus iturensis, new subspecies. Male juvenile, Amer. Mus. No. 52036, Akenge, October 9, 1913.

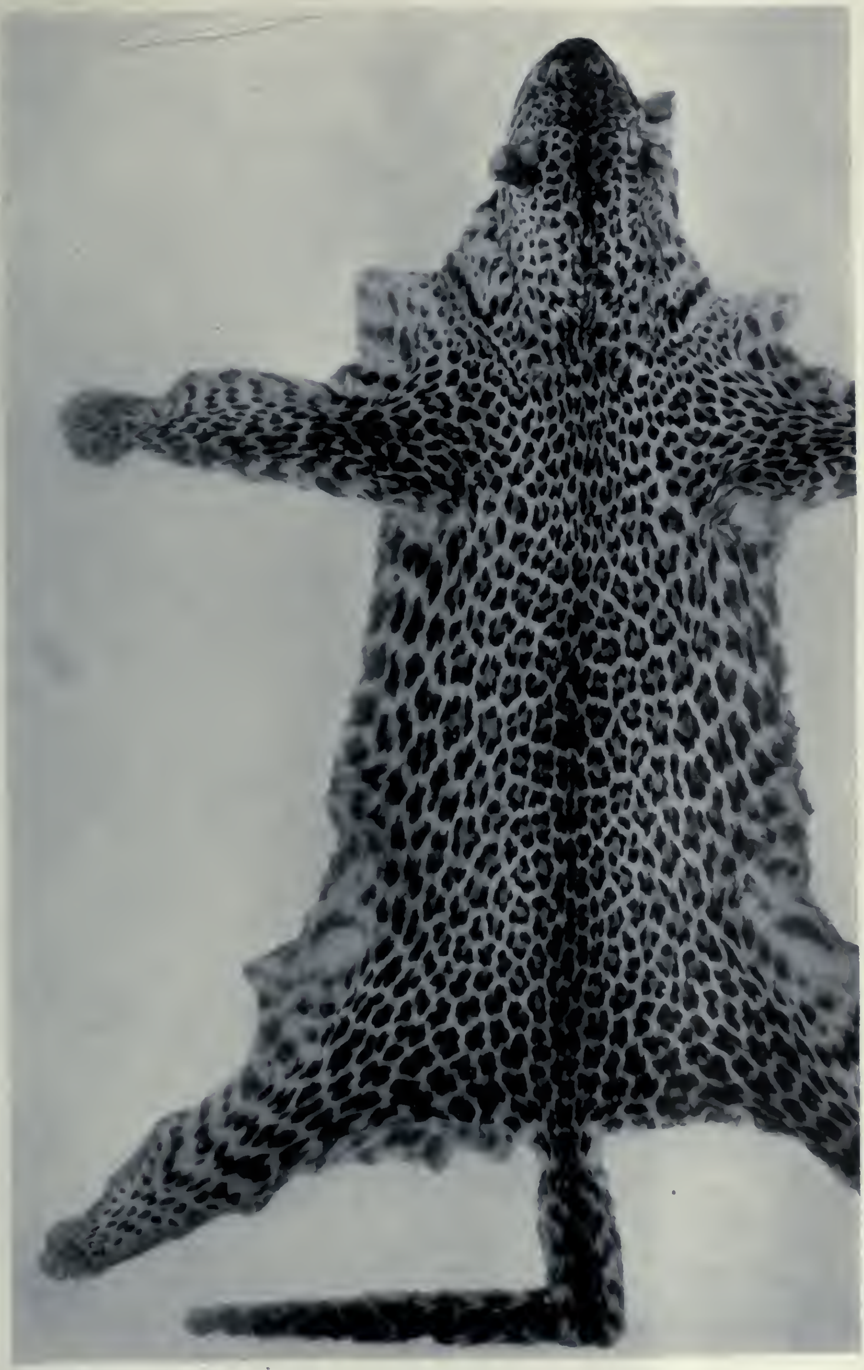


PLATE LXII

Panthera pardus iturensis, new subspecies. Male juvenile, Amer. Mus. No. 52037, Akenge, October 22, 1913. Total length of animal, 600 mm.

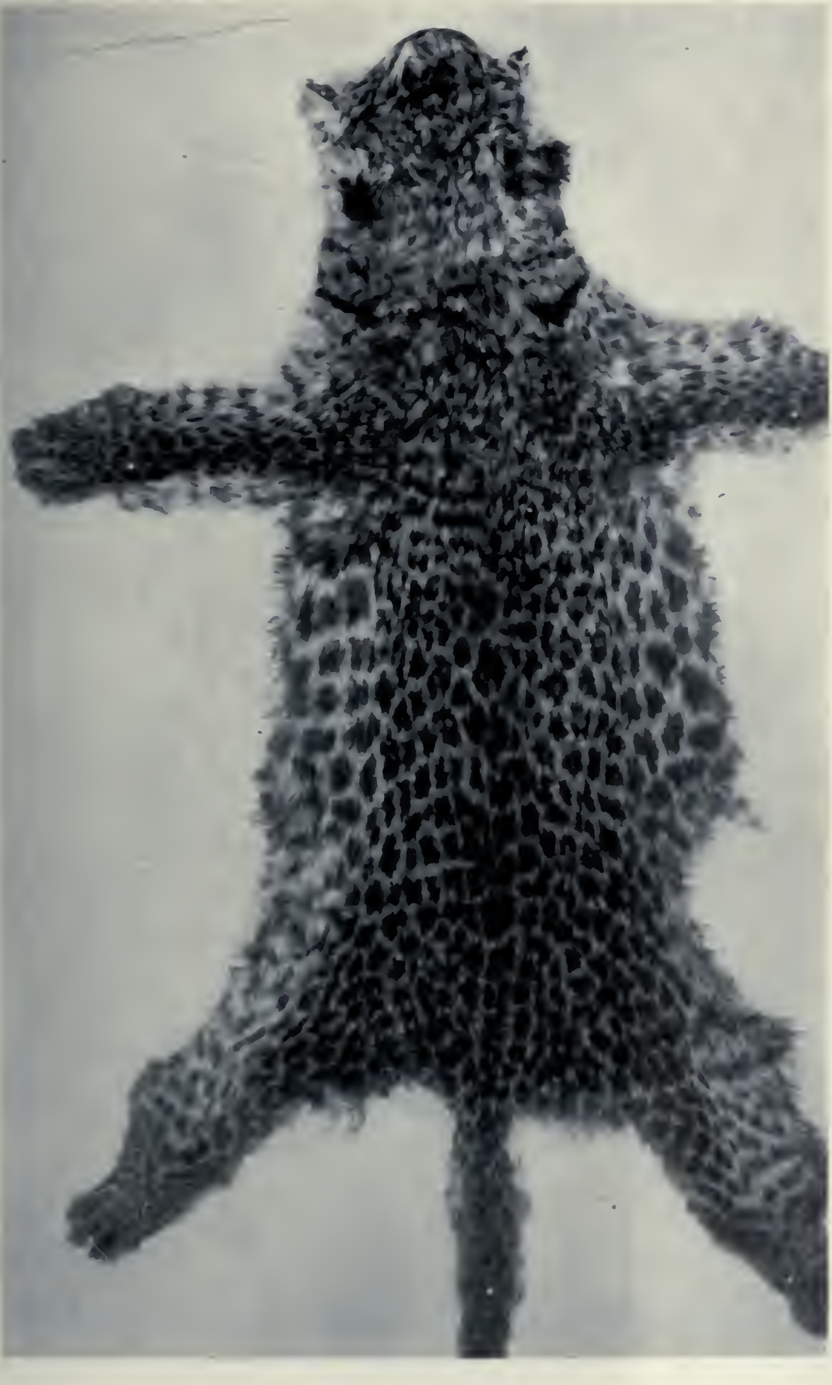


PLATE LXIII

Panthera pardus iturensis, new subspecies. Male juvenile, Amer. Mus. No. 52038, Akenge, October 22, 1913. Total length of animal, 590 mm.

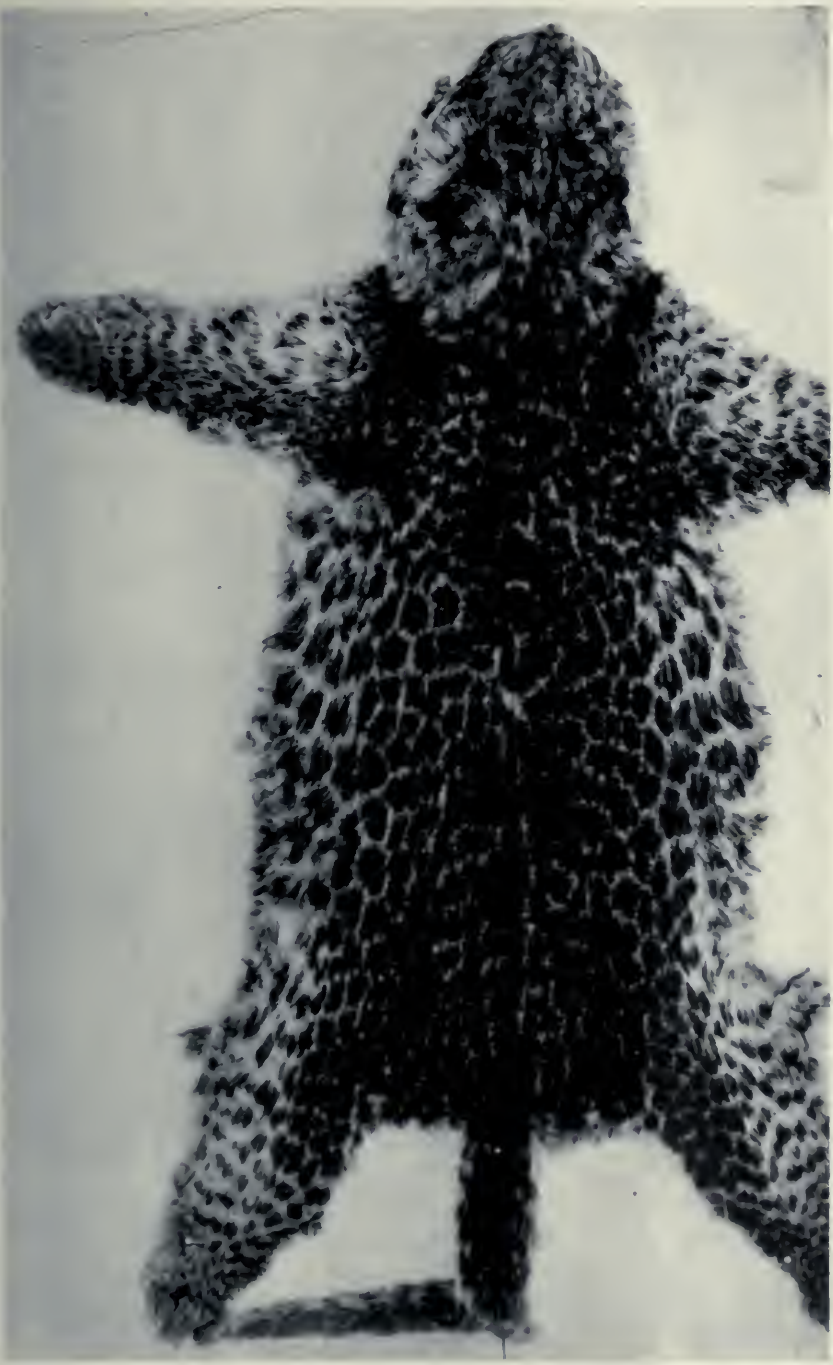


PLATE LXIV

Panthera pardus iturensis, new subspecies. Female juvenile, Amer. Mus. No. 52034, Akenge, September 17, 1913.

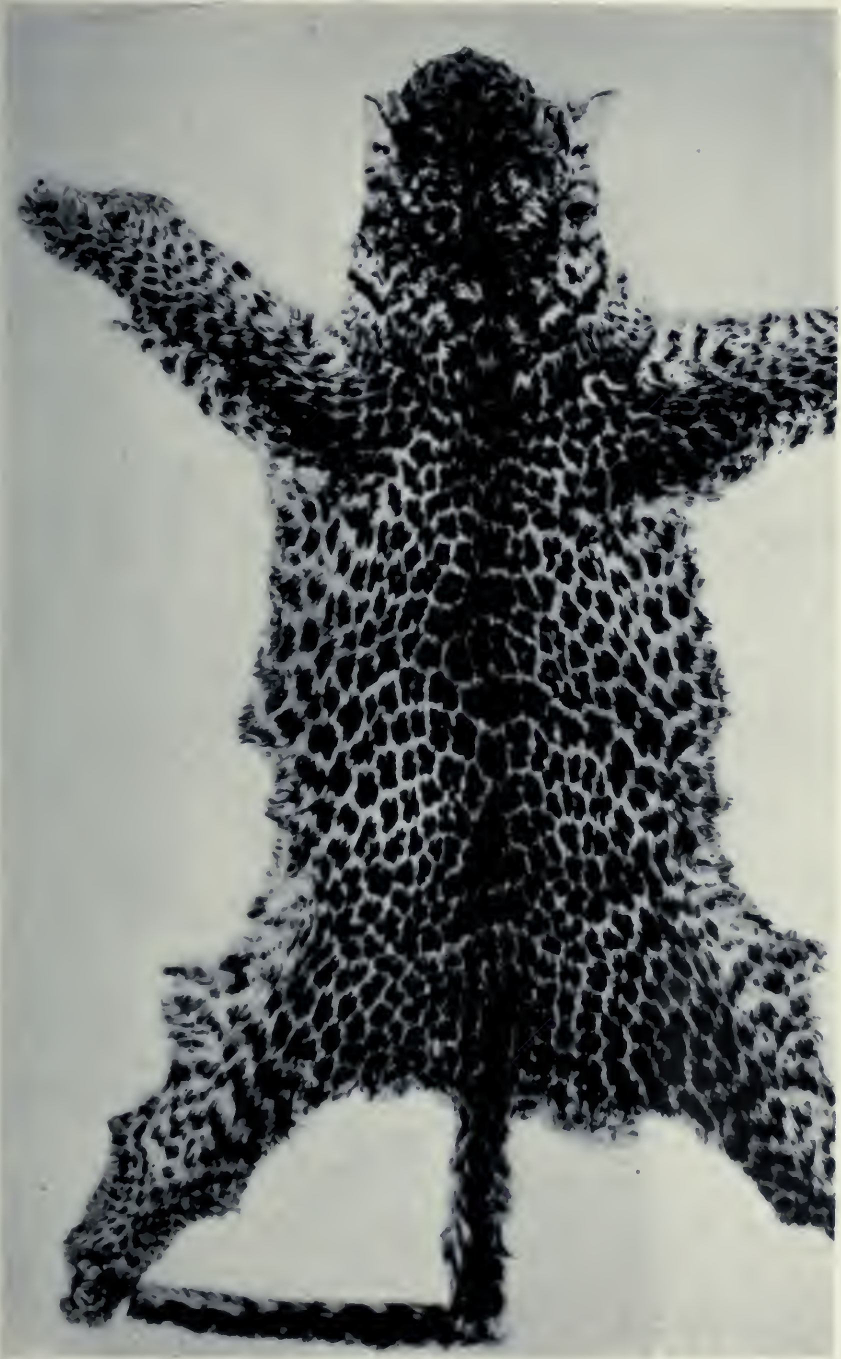


Plate LXV

Leptailurus serval faradjius, new subspecies. Type. Male adult, Amer. Mus. No. 51990, Faradje, November 26, 1912. Total length of animal, 1102 mm. Photograph from specimen in the flesh.

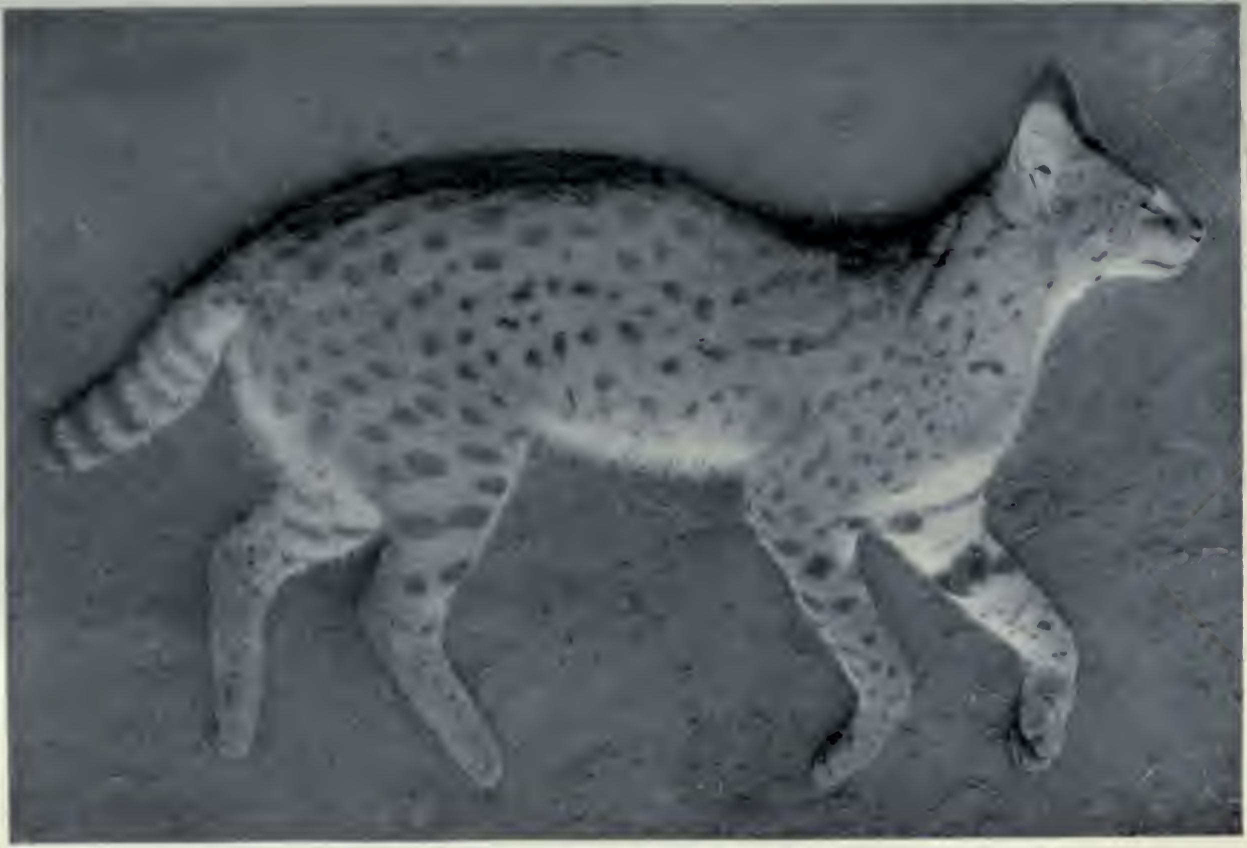
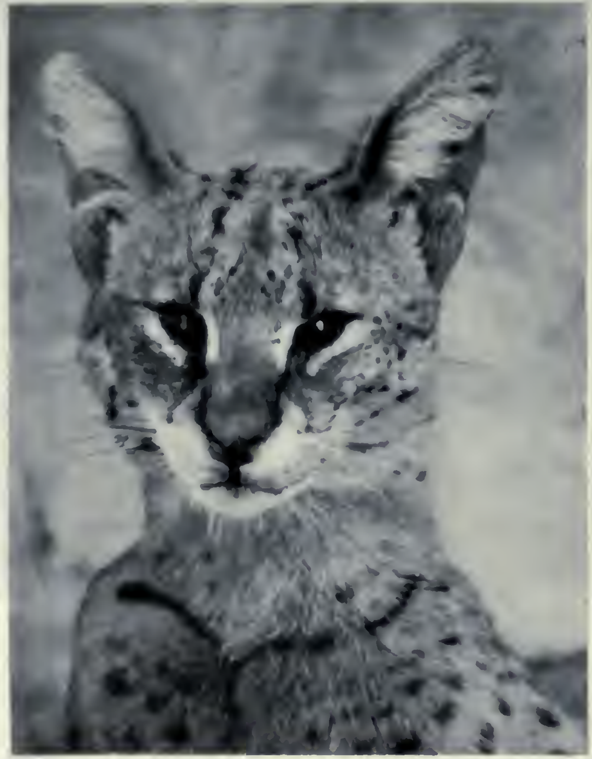


PLATE LXVI

Figs. 1 and 2. *Leptailurus serval faradjius*, new subspecies. Type. Male adult, Amer. Mus. No. 51990, Faradje, November 26, 1912. Total length of animal, 1102 mm. Photographs from specimens in the flesh.



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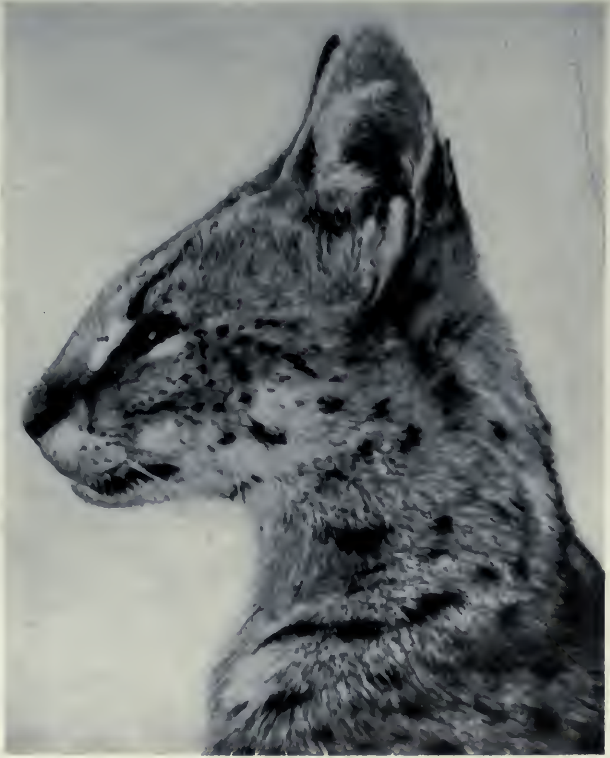

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PLATE LXVII

Leptailurus serval faradjius, new subspecies. Amer. Mus. No. 51987, Faradje, August 13, 1912.

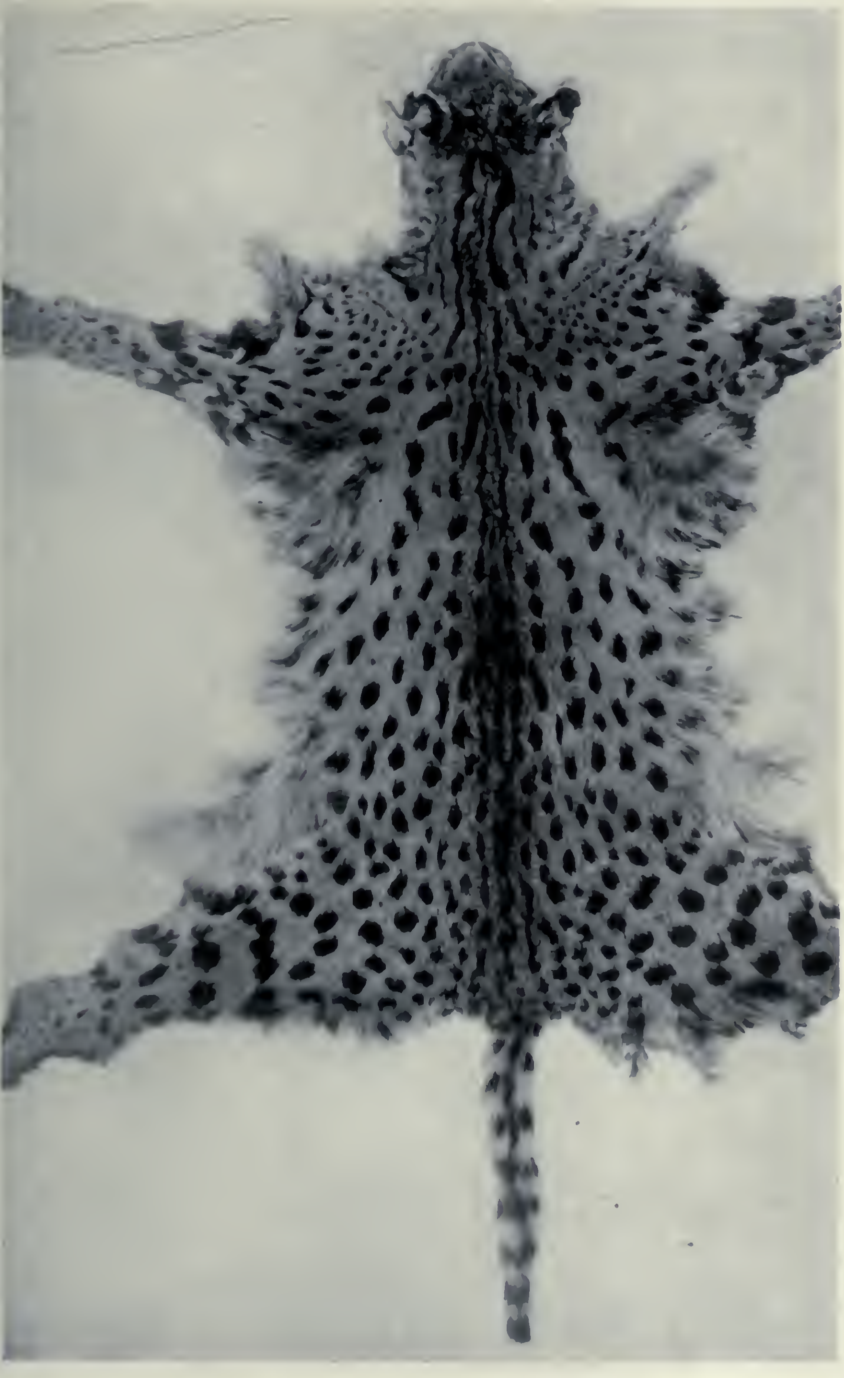


PLATE LXVIII

Leptailurus serval faradjius, new subspecies. Male adult, Amer. Mus. No. 51983, Faradje, June 6, 1911.

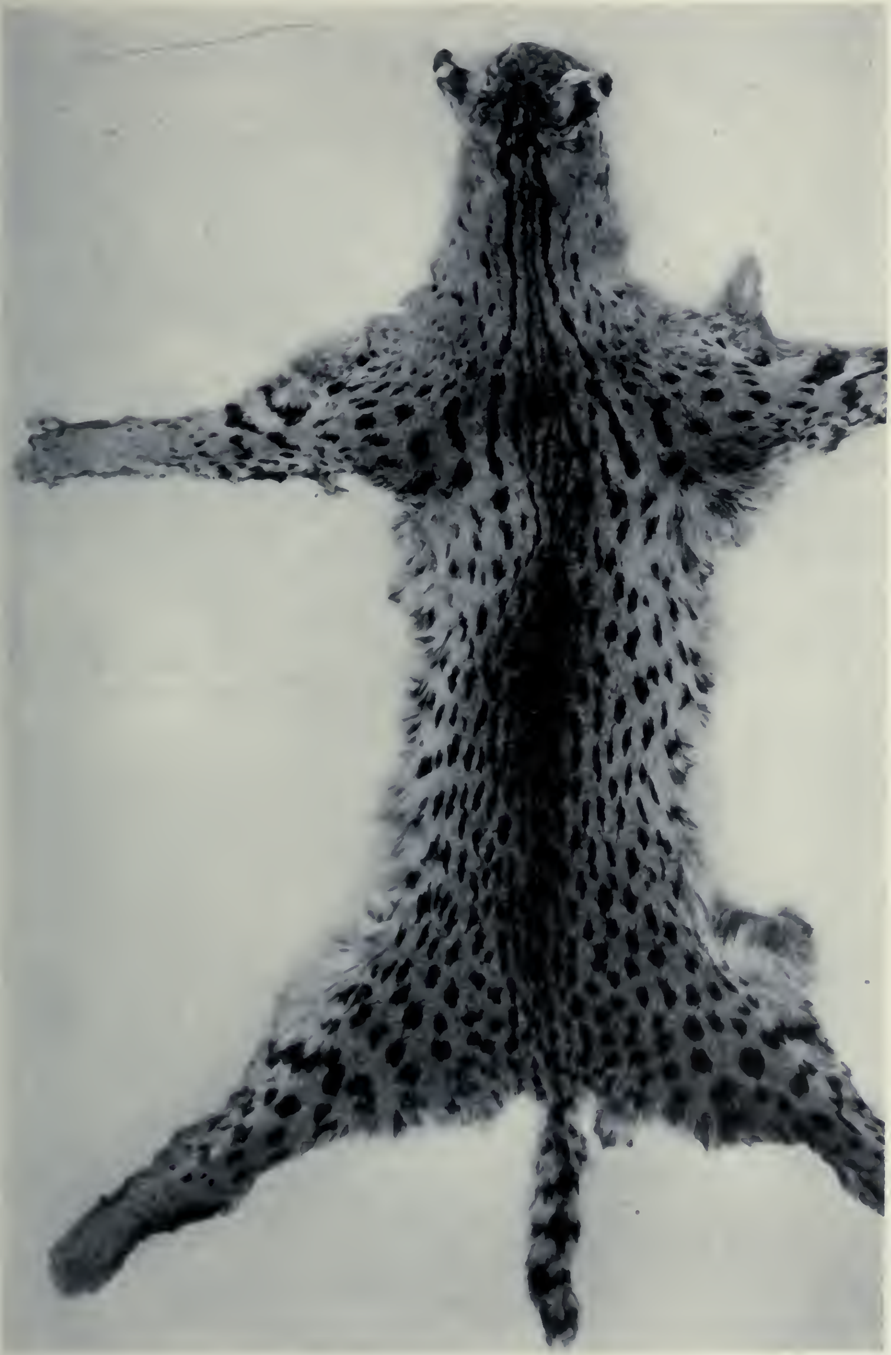
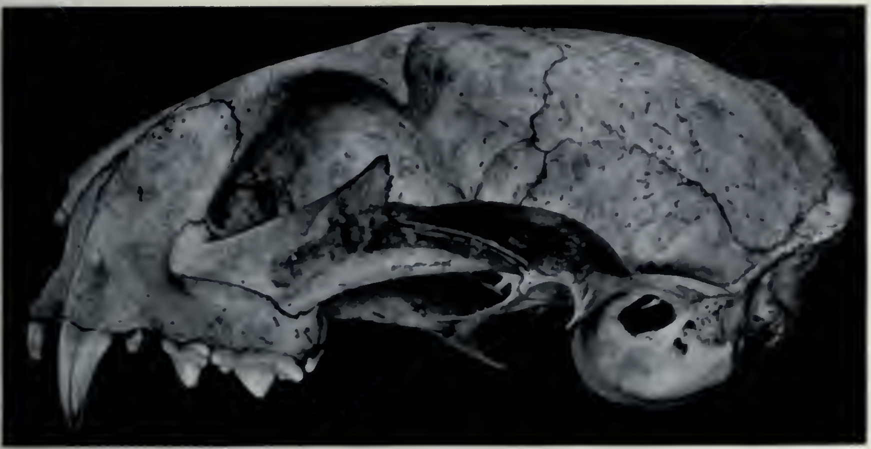


PLATE LXIX

Figs. 1 and 2. *Leptailurus serval faradjius*, new subspecies. Type skull. Male adult, Amer. Mus. No. 51990, Faradje, November 26, 1912. About natural size.



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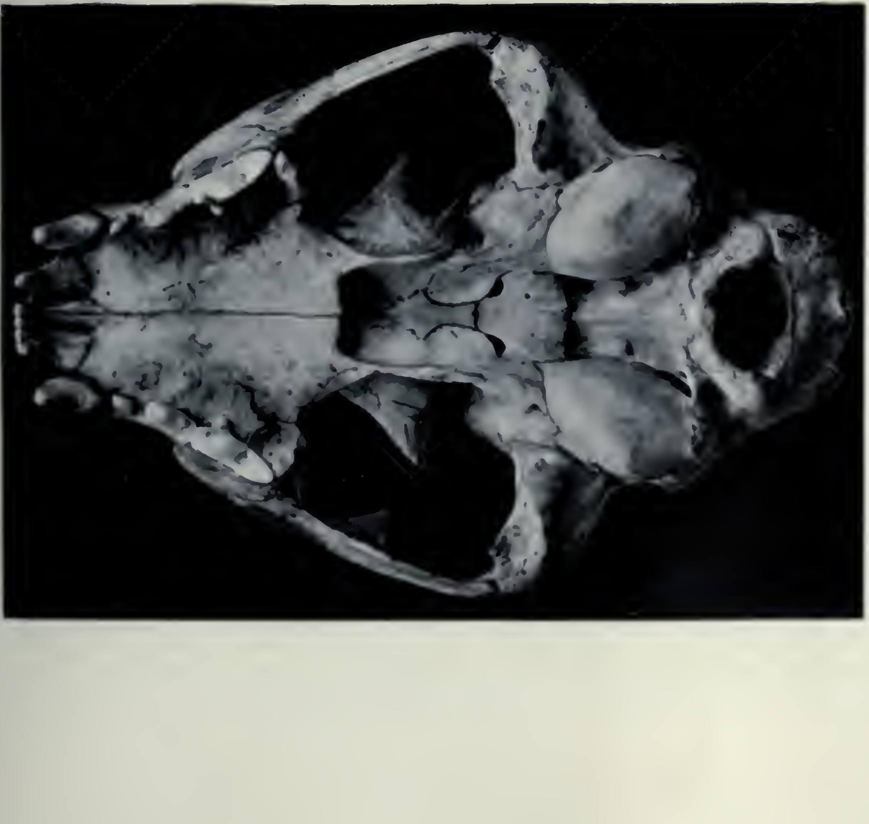

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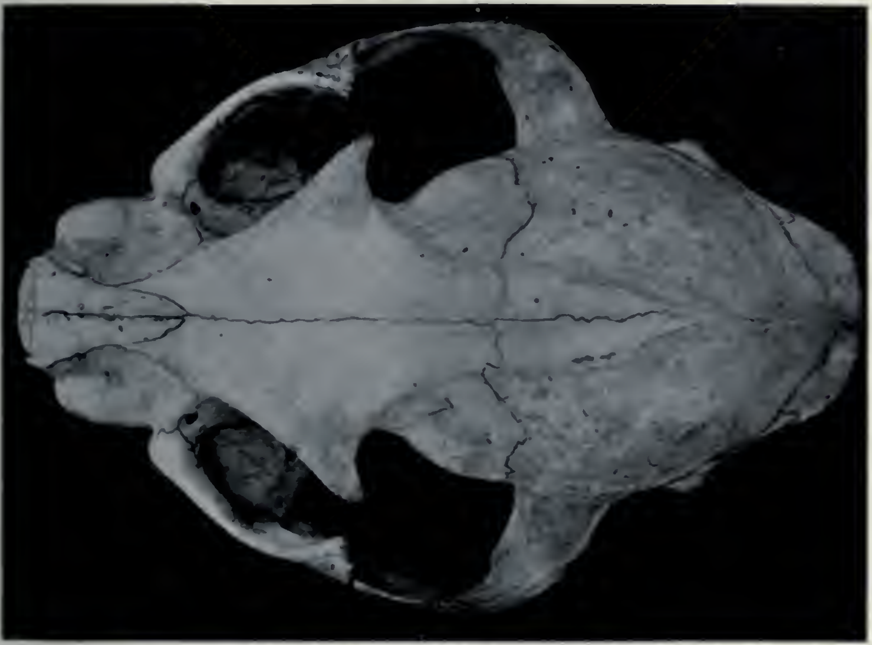
PLATE LXX

Figs. 1 and 2. *Leptailurus serval faradjius*, new subspecies. Type skull. Male adult, Amer. Mus. No. 51990, Faradje, November 26, 1912. About natural size.



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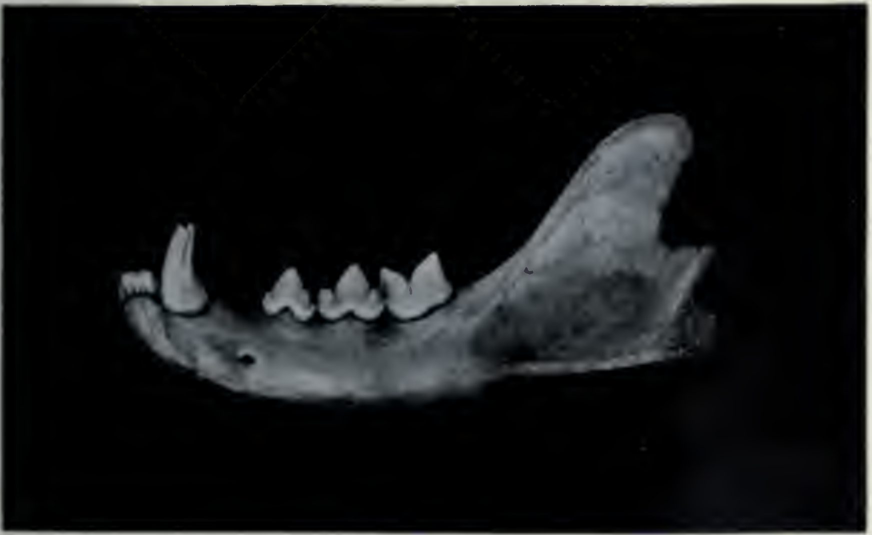

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PLATE LXXI

Leptailurus serval kempi (Wroughton). Male adult, Amer. Mus. No. 27837, Kijabe, British East Africa, June 3, 1906. Tjader East African Expedition.

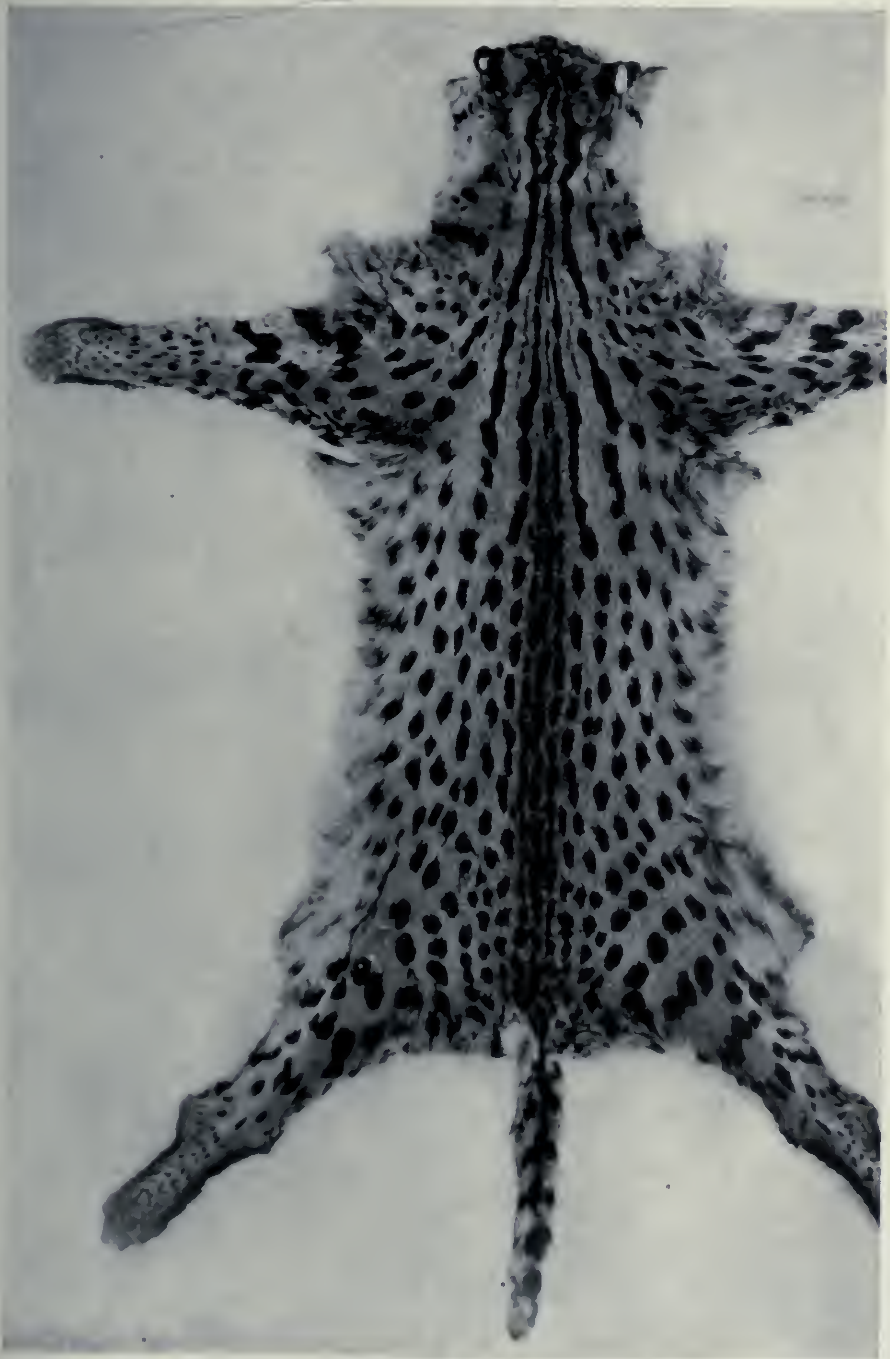


PLATE LXXII

Leptailurus ogilbyi pantasticta (Pocock). Female adult, Amer. Mus. No. 51989, Faradje, October 29, 1912.

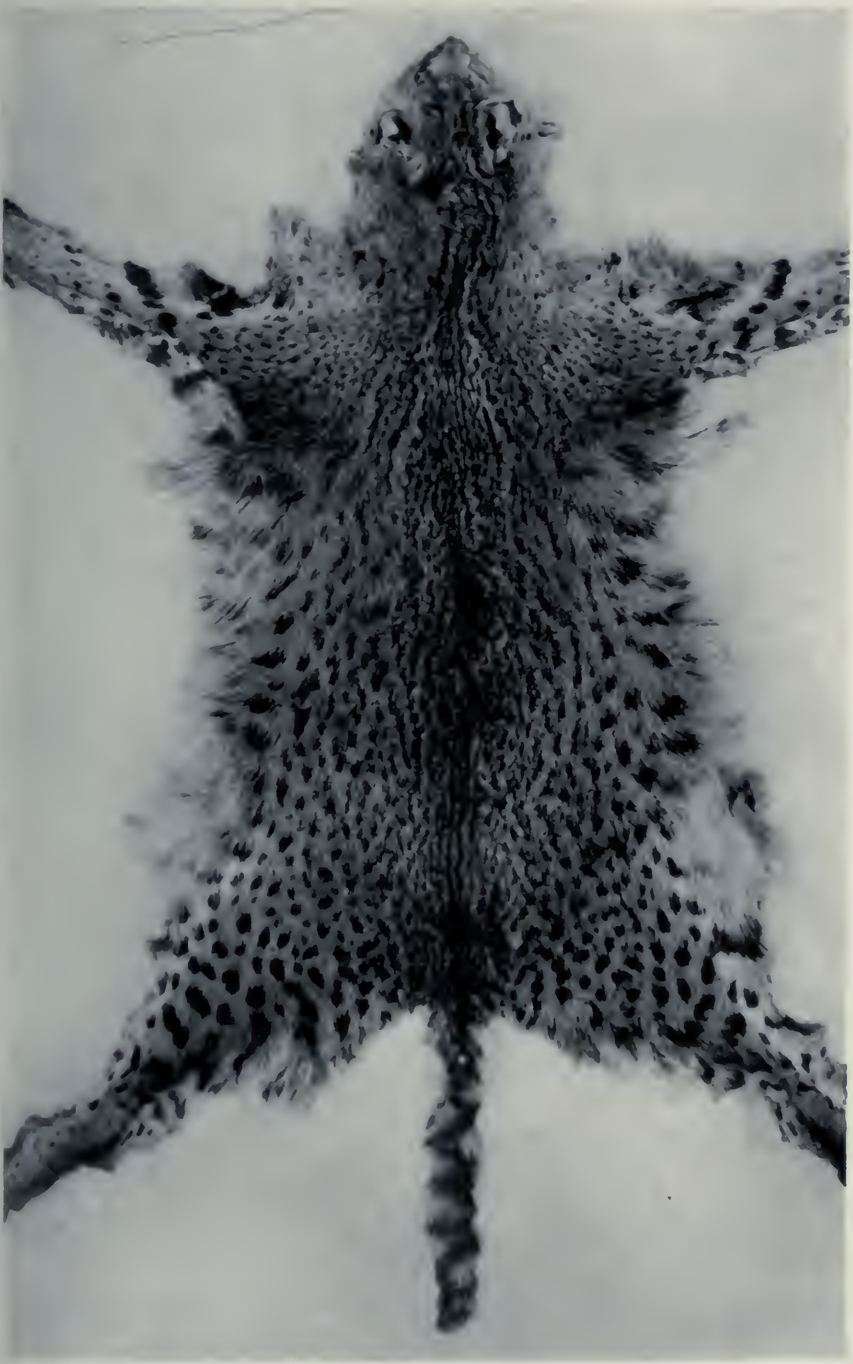


PLATE LXXIII

Leptailurus ogilbyi pantasticta (Pocock). Female adult, Amer. Mus. No. 51984, Faradje, June 6, 1911.

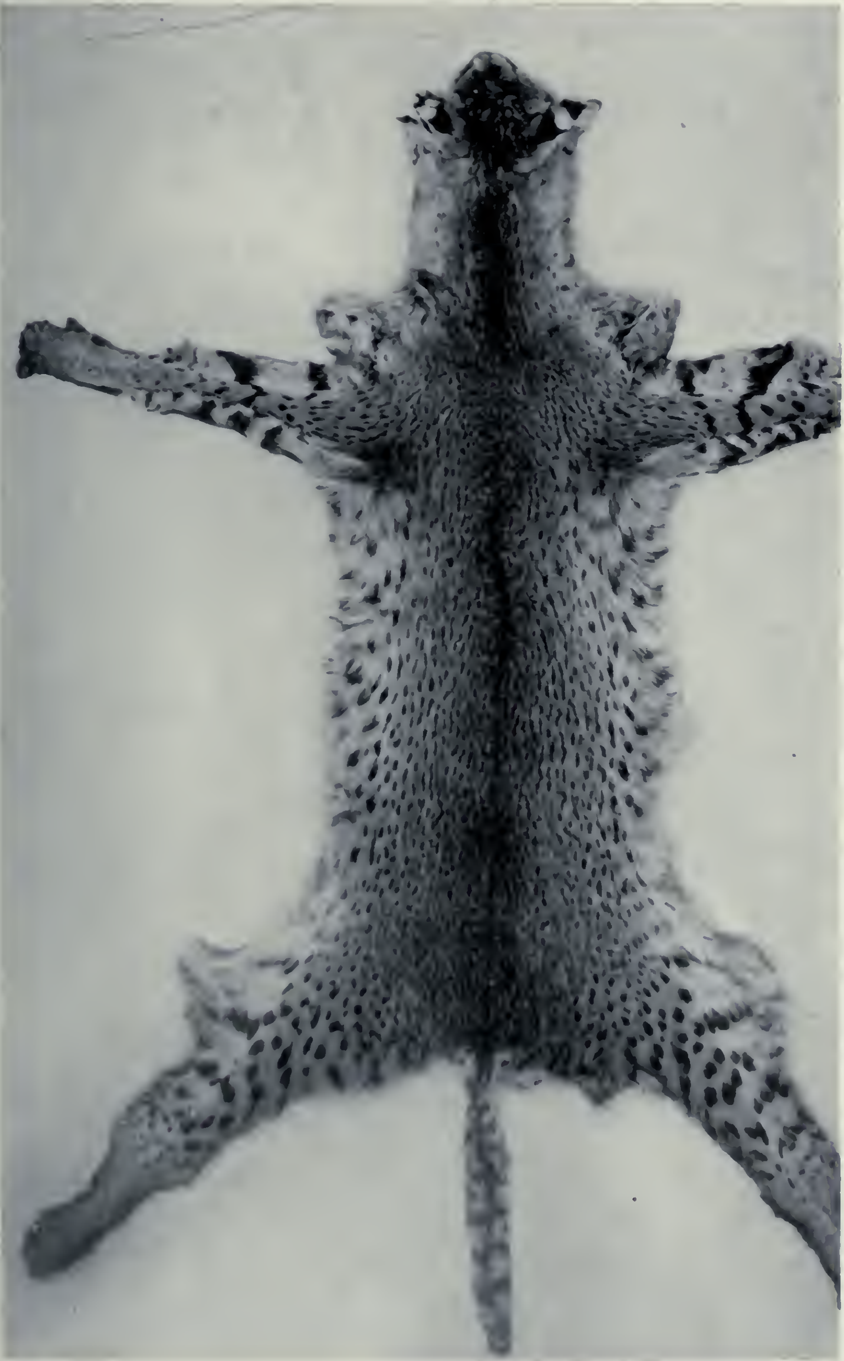
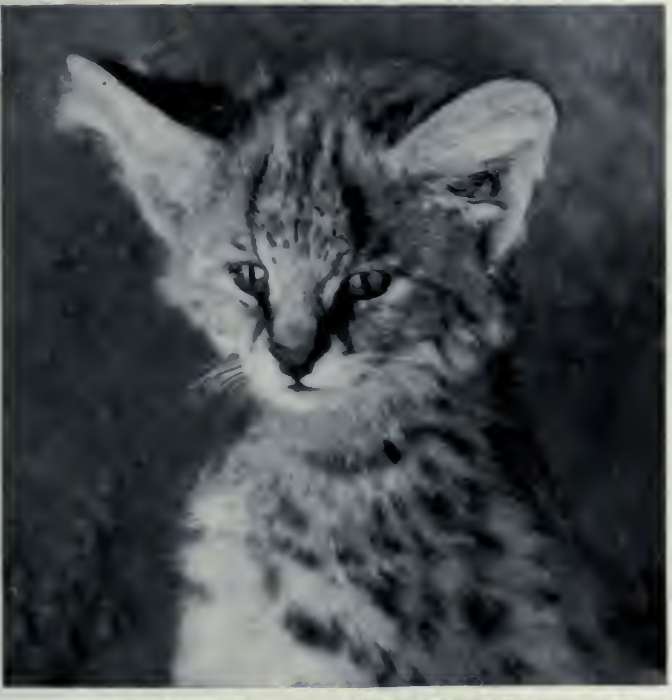


Plate LXXIV

Fig. 1. *Leptailurus serval faradjius*, new subspecies. Male juvenile, Amer. Mus. No. 51973, Faradje, February 18, 1911. Total length of animal, 560 mm.

Fig. 2. *Profelis aurata cottoni* (Lydekker). Female adult, Amer. Mus. No. 51993, Medje, February 28, 1910. Total length of animal, 960 mm. Photographs from specimens in the flesh.



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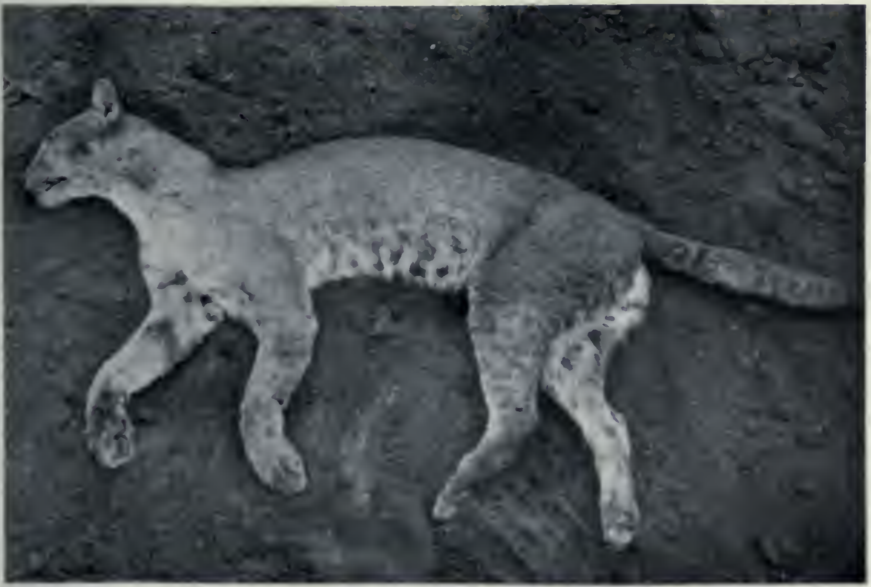

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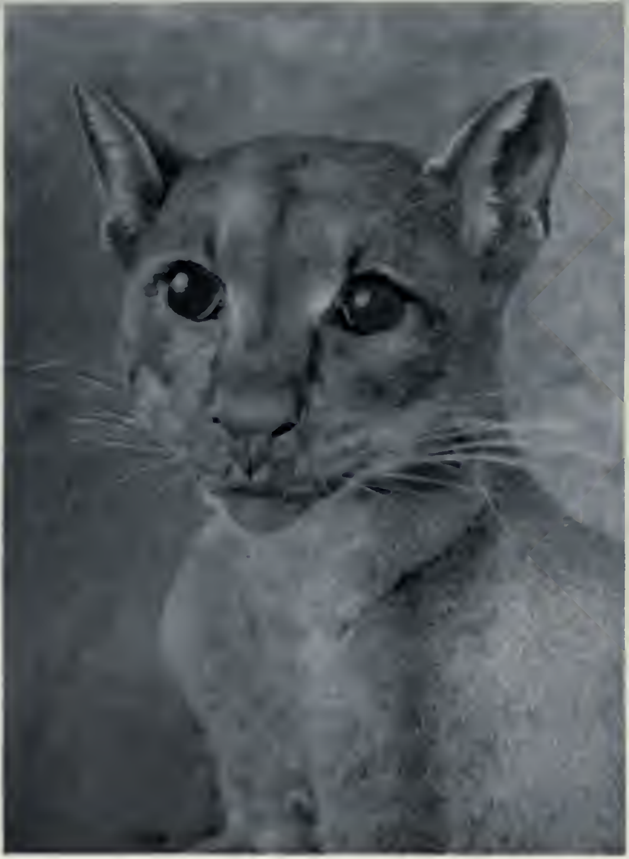
PLATE LXXV

Figs. 1 and 2. *Profelis aurata cottoni* (Lydekker). Female adult, Amer. Mus. No. 51998, Niapu, November 21, 1913. Total length of animal, 1010 mm. Photographs from specimens in the flesh.



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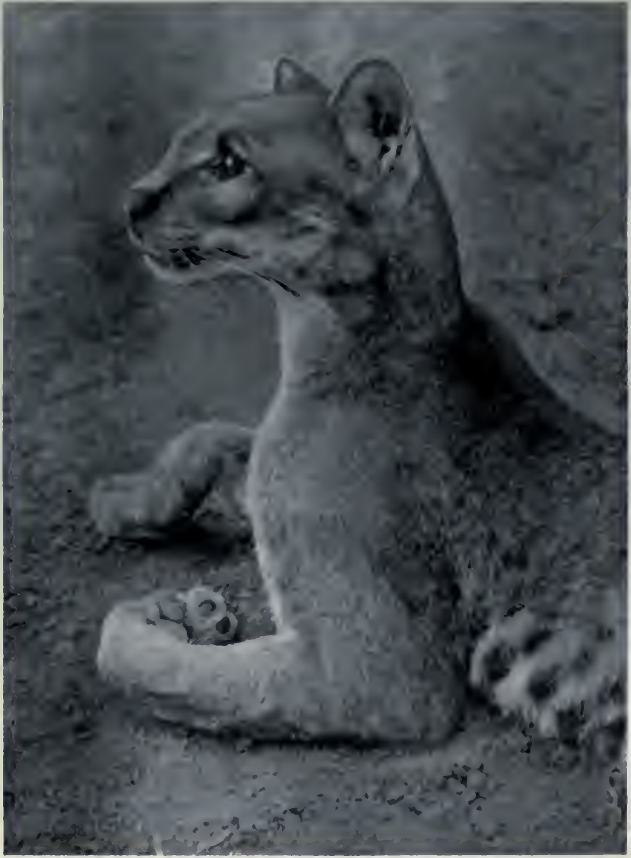

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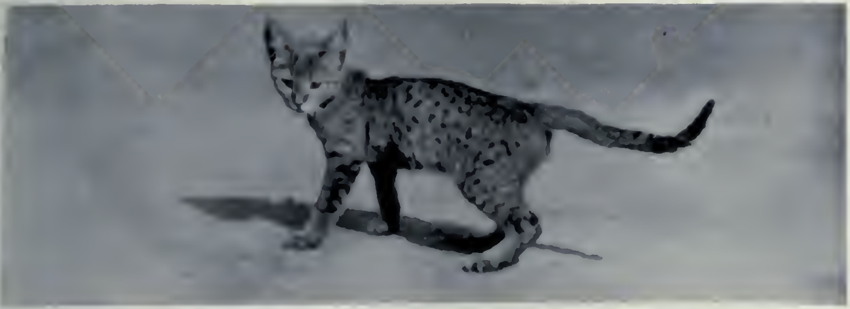
Plate LXXVI

Figs. 1 and 2. *Felis ocreata rubida* Schwann. Half-grown male. Faradje, October 15, 1912. (Not in collection.) Photographs from live specimen.

Fig. 3. *Felis ocreata rubida* Schwann. Female adult, Amer. Mus. No. 51971, Faradje, November 19, 1911. Total length of animal, 800 mm. Photograph from specimen in the flesh.



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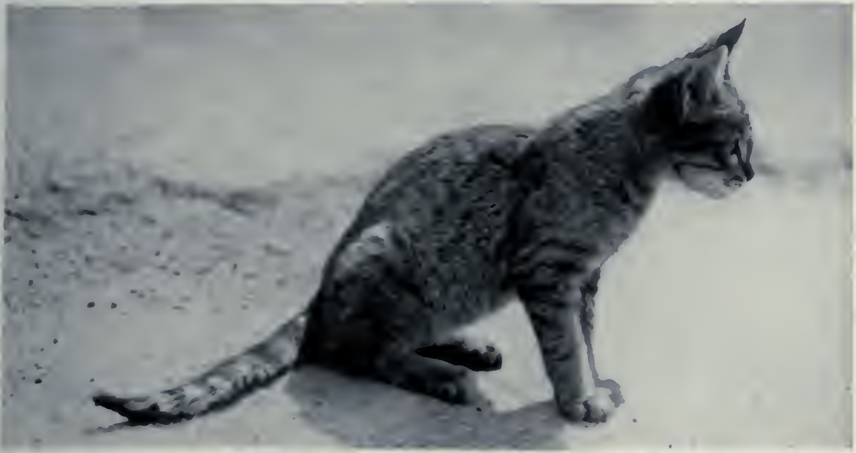

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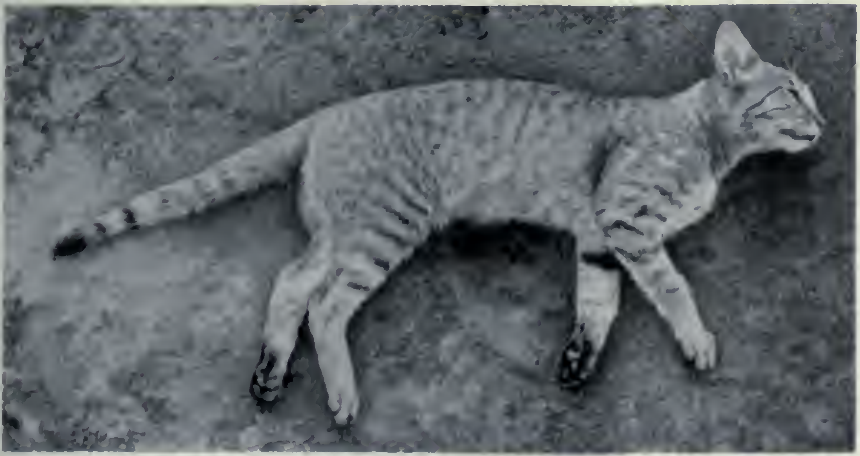

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Plate LXXVII

Fig. 1. *Felis ocreata rubida* Schwann. Amer. Mus. No. 51964, Faradje, November 26, 1911.

Fig. 2. *Felis ocreata rubida* Schwann. Amer. Mus. No. 51962, Faradje, November 26, 1911.

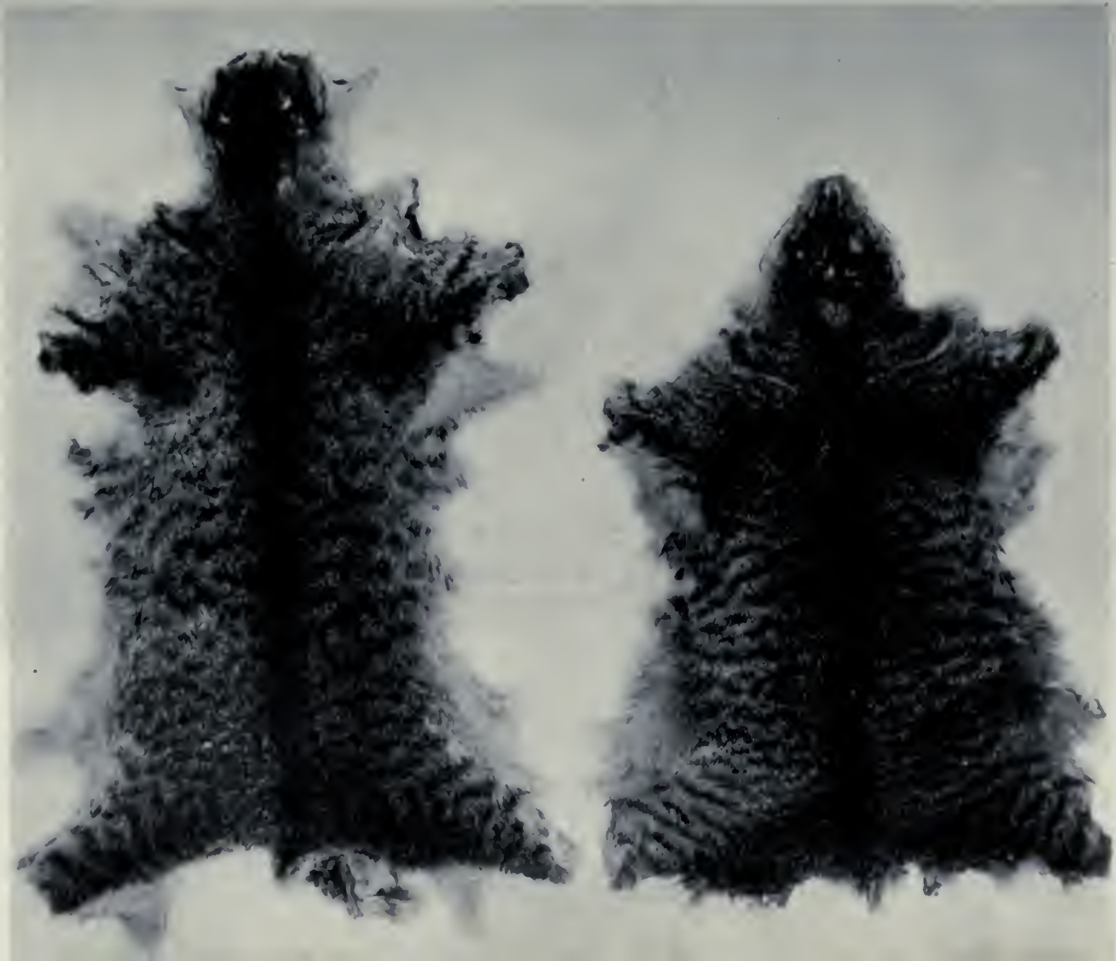

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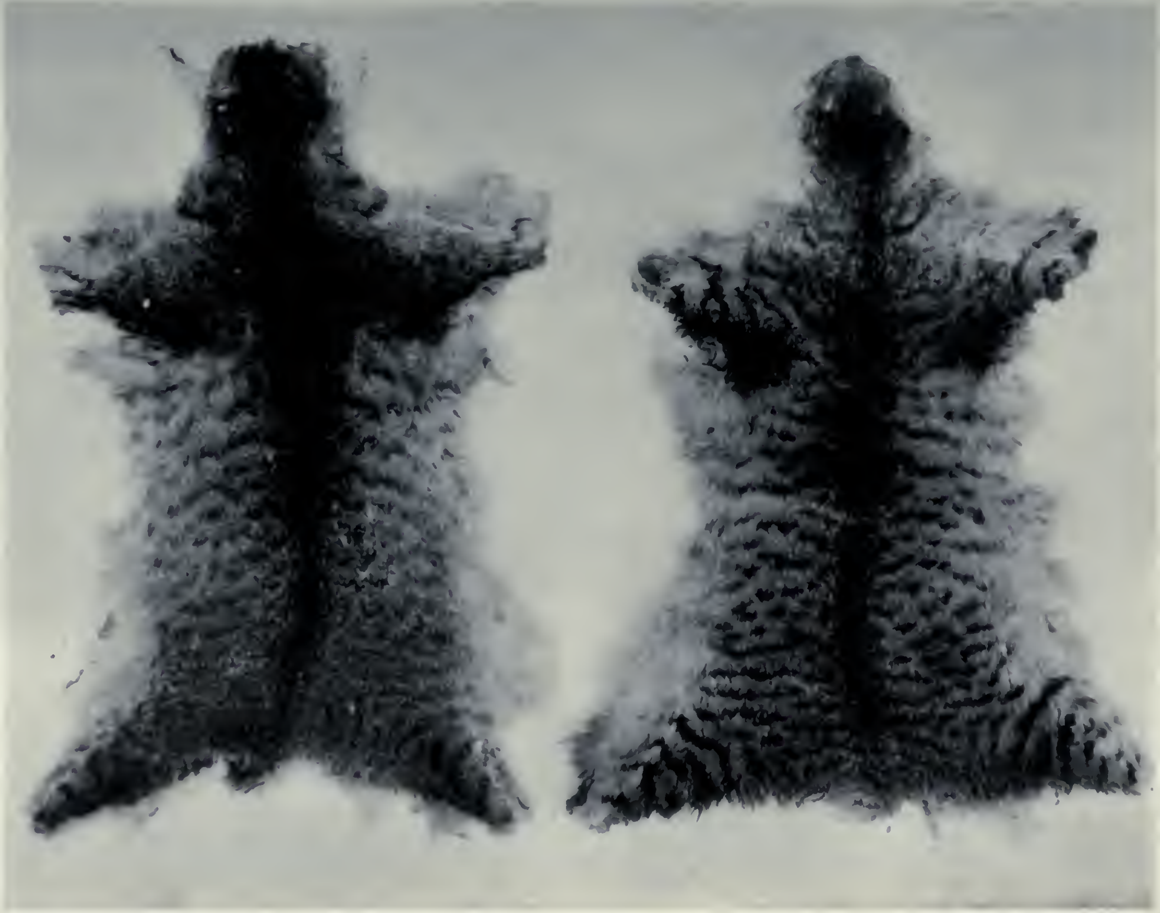
PLATE LXXVIII

Fig. 1. *Felis ocreata rubida* Schwann. Amer. Mus. No. 51969, Faradje, October 29, 1912.

Fig. 2. *Felis ocreata rubida* Schwann. Amer. Mus. No. 51965, Faradje, August 13 1912.



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59.9,8(67.5)

Article IV.—PRIMATES COLLECTED BY THE AMERICAN MUSEUM CONGO EXPEDITION[1]

BY J. A. ALLEN[2]

PLATES LXXIX TO CLXVII, TEXT FIGURES 1 TO 3, AND MAP

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[1] Scientific Results of the Congo Expedition. Mammalogy, No. 10.

[2] [Dr. Allen died on August 29, 1921. His manuscript did not take into account papers issued after December 1920. The references have been revised. Only the captions to plates and figures, and such parts as are set in square brackets and initialed "H.L." were not written by Dr. Allen. The report therefore represents Dr. Allen's final work, arranged for publication by Herbert Lang. The large and numerous tables of measurements have been reduced to averages, minima, maxima, and ratios. The original tables, however, will be deposited in the files of the Osborn Paleontological Library of The American Museum of Natural History, where they will be available to other investigators.—Ed.]

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INTRODUCTION

[The primates collected by Herbert Lang and James P. Chapin during the American Museum Congo Expedition (1909–1915) number 645 specimens, of which 66 represent the Lemuridæ, 549 the Lasiopygidæ, and 30 the Pongidæ. Among them are 28 forms (25 species and 3 additional subspecies), with one species new to science. There is one new genus; and one new generic name is proposed. There are also 74 skeletons, 23 of them those of chimpanzees, and 8 specimens preserved in alcohol.

Previous to the accession of the Lang-Chapin collection the American Museum had very little material of West African primates. These representative series from a circumscribed region have added much to our knowledge of the relatively large variation pertaining in primates taken in the same locality. Only of four forms of *Colobus* can the cranial variation at present be illustrated (Pls. CXII to CLI); Pls. CII and CIII show the type skull of the new species *Colobus langi;* and Text Figs. 1 to 3, drawn by Mrs. H. Ziska, illustrate the new genus, *Allenopithecus* Lang.—H. L.]

A very welcome addition are the series of portraits representing most of the primates in the collection; these were made by Herbert Lang in the field, mostly from specimens in the flesh.

In addition to the comparative material available in The American Museum of Natural History, important series of primates have been generously loaned by the United States National Museum, through the kindness of Mr. Gerrit S. Miller, Jr., Curator of Mammals, and Mr. Ned Hollister; the Academy of Natural Sciences of Philadelphia, through the courtesy of Dr. Witmer Stone; and the Museum of Comparative Zoology of Harvard University, through the kindness of Mr. Samuel Henshaw, Director, and Dr. Glover M. Allen, Curator of Mammals; to all of whom I am much indebted. I am also grateful to Dr. T. S. Palmer, author of the 'Index Generum Mammalium,' for verification of references and transcripts from rare volumes not otherwise available.

SPECIES AND SUBSPECIES, WITH THEIR LOCALITIES AND NUMBER OF SPECIMENS FROM EACH LOCALITY

	Species and Subspecies	Localities	Specimens
		Lemuridæ	
1.	*Perodicticus potto faustus*	Akenge, 6; Avakubi, 3; Medje, 18; Niangara, 2; Niapu, 6; Rungu, 1; Stanleyville, 1.	37
2.	*Galagoides demidoffii medius*	Akenge, 1; Avakubi, 2; Medje, 16; Niangara, 7; Niapu, 1; Stanleyville, 2.	29
		Lasiopygidæ	
3.	*Papio doguera tessellatus*	Akenge, 4; Avakubi, 1; Niapu, 2.	7
4.	*Papio doguera heuglini*	Aba, 1; Bafuka, 5; Faradje, 2.	8
5.	*Cercocebus agilis*	Akenge, 13; Faradje, 2; Niapu, 19; Panga, 1; Penge, 1.	36
6.	*Cercocebus albigena ituricus*	Akenge, 21; Avakubi, 5; Bafuka, 3; Gamangui, 8; Medje, 2; Ngayu, 1; Niapu, 5; Poko, 1; Risimu, 3; Ukaturaka, 2.	51
7.	*Cercocebus aterrimus*	Stanleyville, 2.	2
8.	*Rhinostigma hamlyni*	Somewhere south of Stanleyville, 1.	1
9.	*Lasiopyga brazzæ uelensis*	Avakubi, 4; Bafuka, 6; Banalia, 1; Faradje, 2; Niangara, 12; Niapu, 8; Poko, 1; Ukaturaka, 6.	40
10.	*Lasiopyga l'hœsti l'hœsti*	Babeyru, 1; Gamangui, 10; Stanleyville, 1.	12
11.	*Lasiopyga kandti*	Kisenje, 2.	2

Lasiopygidæ (*continued*)

Species and Subspecies	Localities	Specimens
12. *Lasiopyga leucampyx stuhlmanni*	Akenge, 25; Avakubi, 4; Gamangui, 19; Medje, 8; Niapu, 11; Risimu, 1.	68
13. *Lasiopyga denti*	Akenge, 9; Avakubi, 3; Batama, 4; Gamangui, 14; Medje, 5; Niapu, 9; Poko, 1; Risimu, 1; Rungu, 1.	47
14. *Lasiopyga wolfi*	Mosembe, 1.	1
15. *Lasiopyga ascanius cirrhorhinus*	Akenge, 14; Avakubi, 2; Bafwabaka, 1; Bafwasende, 1; Bafwaboli, 4, Faradje, 1; Gamangui, 2; Kamunionge, 2; Lubilo, 3; Medje, 4; Munye Katoto, 1, Niapu, 2; Rungu, 1; Stanleyville, 1.	39
16. *Lasiopyga ascanius pelorhinus*	Ukaturaka, 5.	5
17. *Lasiopyga cephus*	Zambi, 1.	1
18. *Lasiopyga pygerythra griseisticta*	Aba, 2; Faradje, 8; Vankerckhovenville, 2; Yakuluku, 3.	15
19. *Allenopithecus nigroviridis*	Bolobo, 1.	1
20. *Erythrocebus patas pyrronotus*	Faradje, 4; Niangara, 1.	5
21. *Colobus tholloni*	Bolobo, 2; Lukolela, 2.	4
22. *Colobus langi*	Risimu, 3.	3
23. *Colobus ellioti*	Avakubi, 1.	1
24. *Colobus powelli powelli*	Abawe, 2; Akenge, 27; Avakubi, 1; Bafwabaka, 1; Gamangui, 3; Medje, 1; Niapu, 8.	43
25. *Colobus powelli brunneus*	Bafuka, 2, Faradje, 40.	42
26. *Colobus abyssinicus ituricus*	Avakubi, 7; Bafuka, 1, Faradje, 38; Vankerckhovenville, 1; Yakuluku, 2.	49
27. *Colobus angolensis cottoni*	Akenge, 23, Avakubi, 3; Gamangui, 9; Medje, 1; Niapu, 23; Poko, 4; Ukaturaka, 1; unknown locality, 2.	66
	Pongidæ	
28. *Pan schweinfurthii*	Aba, 3; Akenge, 4; Avakubi, 1; Faradje, 9; Gamangui, 1; Medje, 6; Ngayu, 1; Niapu, 4; Pawa, 1.	30

List of Localities,[1] with Names of the Species and Subspecies, and Number of Specimens Taken at Each Locality

Localities	Species and Subspecies	No. of Specimens	Totals
Aba	*Papio doguera heuglini*	1	
“	*Lasiopyga pygerythra griseisticta*	2	
“	*Pan schweinfurthii*	3	6
Abawe	*Colobus powelli powelli*	2	2
Akenge	*Perodicticus potto faustus*	6	
“	*Galagoides demidoffii medius*	1	
“	*Papio doguera tessellatus*	4	
“	*Cercocebus agilis*	13	
“	*Cercocebus albigena ituricus*	21	
“	*Lasiopyga leucampyx stuhlmanni*	25	
“	*Lasiopyga denti*	9	
“	*Lasiopyga ascanius cirrhorhinus*	14	
“	*Colobus powelli powelli*	27	
“	*Colobus angolensis cottoni*	23	
“	*Pan schweinfurthii*	4	147
Avakubi	*Perodicticus potto faustus*	3	
“	*Galagoides demidoffii medius*	2	
“	*Papio doguera tessellatus*	1	
“	*Cercocebus albigena ituricus*	5	
“	*Lasiopyga brazzæ uelensis*	4	
“	*Lasiopyga leucampyx stuhlmanni*	4	
“	*Lasiopyga denti*	3	
“	*Lasiopyga ascanius cirrhorhinus*	2	
“	*Colobus ellioti*	1	
“	*Colobus powelli powelli*	1	
“	*Colobus abyssinicus ituricus*	7	
“	*Colobus angolensis cottoni*	3	
“	*Pan schweinfurthii*	1	37
Babeyru	*Lasiopyga l'hœsti l'hœsti*	1	1
Bafuka	*Papio doguera heuglini*	5	
“	*Cercocebus albigena ituricus*	3	
“	*Lasiopyga brazzæ uelensis*	6	
“	*Colobus powelli brunneus*	2	
“	*Colobus abyssinicus ituricus*	1	17
Bafwabaka	*Lasiopyga ascanius cirrhorhinus*	1	
“	*Colobus powelli powelli*	1	2
Bafwasende	*Lasiopyga ascanius cirrhorhinus*	1	1
Bafwaboli	*Lasiopyga ascanius cirrhorhinus*	4	4
Banalia	*Lasiopyga brazzæ uelensis*	1	1
Batama	*Lasiopyga denti*	4	4

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[1] The principal localities will be found on the map (p. 498); the location of others is indicated on page 499.

Localities	Species and Subspecies	No. of Specimens	Totals
Bolobo	*Allenopithecus nigroviridis*	1	
“	*Colobus tholloni*	2	3
Faradje	*Papio doguera heuglini*	2	
“	*Cercocebus agilis*	2	
“	*Lasiopyga brazzæ uelensis*	2	
“	*Lasiopyga ascanius cirrhorhinus*	1	
“	*Lasiopyga pygerythra griseisticta*	8	
“	*Erythrocebus patas pyrronotus*	4	
“	*Colobus powelli brunneus*	40	
“	*Colobus abyssinicus ituricus*	38	
“	*Pan schweinfurthii*	9	106
Gamangui	*Cercocebus albigena ituricus*	8	
“	*Lasiopyga l'hœsti l'hœsti*	10	
“	*Lasiopyga leucampyx stuhlmanni*	19	
“	*Lasiopyga denti*	14	
“	*Lasiopyga ascanius cirrhorhinus*	2	
“	*Colobus powelli powelli*	3	
“	*Colobus angolensis cottoni*	9	
“	*Pan schweinfurthii*	1	66
Kamunionge	*Lasiopyga ascanius cirrhorhinus*	2	2
Kisenje	*Lasiopyga kandti*	2	2
Lubilo	*Lasiopyga ascanius cirrhorhinus*	3	3
Lukolela	*Colobus tholloni*	2	2
Medje	*Perodicticus potto faustus*	18	
“	*Galagoides demidoffii medius*	16	
“	*Cercocebus albigena ituricus*	2	
“	*Lasiopyga leucampyx stuhlmanni*	8	
“	*Lasiopyga denti*	5	
“	*Lasiopyga ascanius cirrhorhinus*	4	
“	*Colobus powelli powelli*	1	
“	*Colobus angolensis cottoni*	1	
“	*Pan schweinfurthii*	6	61
Mosembe	*Lasiopyga wolfi*	1	1
Munye Katoto	*Lasiopyga ascanius cirrhorhinus*	1	1
Ngayu	*Cercocebus albigena ituricus*	1	
“	*Pan schweinfurthii*	1	2
Niangara	*Perodicticus potto faustus*	2	
“	*Galagoides demidoffii medius*	7	
“	*Lasiopyga brazzæ uelensis*	12	
“	*Erythrocebus patas pyrronotus*	1	22
Niapu	*Perodicticus potto faustus*	6	
“	*Galagoides demidoffii medius*	1	
“	*Papio doguera tessellatus*	2	
“	*Cercocebus agilis*	19	
“	*Cercocebus albigena ituricus*	5	

Localities	Species and Subspecies	No. of Specimens	Totals
Niapu	*Lasiopyga brazzæ uelensis*	8	
"	*Lasiopyga leucampyx stuhlmanni*	11	
"	*Lasiopyga denti*	9	
"	*Lasiopyga ascanius cirrhorhinus*	2	
"	*Colobus powelli powelli*	8	
"	*Colobus angolensis cottoni*	23	
"	*Pan schweinfurthii*	4	98
Panga	*Cercocebus agilis*	1	1
Pawa	*Pan schweinfurthii*	1	1
Penge	*Cercocebus agilis*	1	1
Poko	*Cercocebus albigena ituricus*	1	
"	*Lasiopyga brazzæ uelensis*	1	
"	*Lasiopyga denti*	1	
"	*Colobus angolensis cottoni*	4	7
Risimu	*Cercocebus albigena ituricus*	3	
"	*Lasiopyga leucampyx stuhlmanni*	1	
"	*Lasiopyga denti*	1	
"	*Colobus langi*	3	8
Rungu	*Perodicticus potto faustus*	1	
"	*Lasiopyga denti*	1	
"	*Lasiopyga ascanius cirrhorhinus*	1	3
Stanleyville	*Perodicticus potto faustus*	1	
"	*Galagoides demidoffii medius*	2	
"	*Cercocebus aterrimus*	2	
"	*Lasiopyga l'hœsti l'hœsti*	1	
"	*Lasiopyga ascanius cirrhorhinus*	1	7
Ukaturaka	*Cercocebus albigena ituricus*	2	
"	*Lasiopyga brazzæ uelensis*	6	
"	*Lasiopyga ascanius pelorhinus*	5	
"	*Colobus angolensis cottoni*	1	14
Vankerckhovenville	*Lasiopyga pygerythra griseisticta*	2	
"	*Colobus abyssinicus ituricus*	1	3
Yakuluku	*Lasiopyga pygerythra griseisticta*	3	
"	*Colobus abyssinicus ituricus*	2	5
Zambi	*Lasiopyga cephus*	1	1
?	*Rhinostigma hamlyni*	1	
"	*Colobus angolensis cottoni*	2	3

NEW GENERIC NAMES

Comopithecus. Replacing *Hamadryas* Lesson, preoccupied. Type, *Simia hamadryas* Linnæus.

Allenopithecus Lang. Type, *Cercopithecus nigroviridis* Pocock.

NEW SPECIES, WITH ITS TYPE LOCALITY

Colobus langi. Risimu.

GENERAL SUMMARY

Families	Genera	Species and Subspecies	Specimens	Localities[1]
Lemuridæ	2	2	66	7
Lasiopygidæ	7	25	549	36
Pongidæ	1	1	30	9
	10	28	645	

SUBORDER LEMUROIDEA

SERIES LORISIFORMES

LORISIDÆ[2]

NOMENCLATURE OF LEMURS

Four genera of lemurs are currently recognized as occurring in Africa: *Galago* (1796), *Perodicticus* (1831), *Galagoides* (1833 = *Hemigalago* 1857), and *Arctocebus* (1863). Only *Perodicticus* and *Galagoides* are represented in the collection made by the American Museum Congo Expedition in the Rain Forest and Savannah of the northeastern Belgian Congo.

Perodicticus ranges as far west as Sierra Leone, thence southward to the French Congo and across the West African Rain Forest as far eastward as the Kakamega Forest, near Mount Elgon; it is not recorded from Angola. *Arctocebus*, as at present known, is restricted to Lower Nigeria, Southern Cameroon, and the lower Beñito River. *Galago* has by far the widest distribution among the African Lemuridæ. It is known from Senegal across the Sudan, and along the coastal region of the West African Forest south to the Gaboon and Angola, eastward to Natal, thence northward to Abyssinia and Senaar. It is not recorded from the interior and northeastern section of the West African Rain Forest, but inhabits the wooded Savannahs. *Galagoides* is typical of the denser forests and contiguous forest galleries. Its range extends from Senegal southward to the Gaboon and across the Rain Forest eastward to the forests adjoining Ruwenzori and those of the volcanoes north of Lake Kivu. By far the greater number of the described forms of African lemurs are referred to the genus *Galago*.

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[1] The total number of localities at which primates were collected is 37.

[2] Only African forms, the Lorisinæ and Galaginæ, are considered; the lemurs of Madagascar (Lemuridæ, Indrisidæ and Daubentoniidæ) are necessarily here excluded.

In 1829 J. B. Fischer ('Synopsis Mammalium') recorded only four species of lemurs from Africa. These are *Galago senegalensis* and *Nycticebus potto* (both described by E. Geoffroy in 1796), *Galago demidoffii* G. Fischer (1806), and *Galago crassicaudatus* E. Geoffroy (1812). No others had then been described, but four additional forms were added during the next decade, and many others later till in 1920 the number of names (including four substitute names) for species and subspecies was sixty-three. Three of the first four described species became later the genotypes respectively of *Galago*, *Perodicticus* and *Galagoides*. Of the fifteen names proposed for genera or subgenera four (*Potto, Macropus, Otolicnus, Hemigalago*) are substitute names, yet two of them (*Otolicnus* and *Hemigalago*) have been employed by many authors as valid names, by some in a generic, by others in a subgeneric sense. The group provisionally recognized in this connection as *Galago* has been divided by various authors into five,[1] to which (with one exception, *Euoticus* Gray) generic rank was accorded by their respective authors.[2]

D. G. Elliot, the latest reviser of the African lemurs, in his 'Review of the Primates,' Vol. I, 1913 (1912), has divided the "*Galago-Hemigalago*" group into two genera (*Galago* and *Hemigalago*), the forms referred to *Galago* being placed in three subgenera, *Otolemur*, *Otolicnus*, *Otogale*. No subgenus *Galago* is recognized but the genotype of *Galago* (*Galago senegalensis*) is placed in his subgenus *Otolicnus*, while the genotype of *Otogale* (*Otolicnus garnettii*) is relegated to his subgenus *Otolemur*. His subgenus *Otolicnus*, nomenclatorially invalid, was avowedly given by its author as a substitute name for *Galago*, on the ground that *Galago* was nonclassical. It happens furthermore that his three subgenera of *Galago* are all nomenclatorially untenable, whatever merit the groups may have taxonomically. Elliot also followed previous authors in using *Hemigalago* instead of *Galagoides*, although the latter has twenty-four years priority and the same genotype (see below, p. 302).

Elliot, in his 'Review of the Primates,' referred thirty forms to *Galago* (twenty-three species and seven subspecies) and four to *Hemigalago* (three species and one subspecies). During the eight years since his work was written four additional forms of *Galago* have been described and one added to *Hemigalago*.

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[1] Absence of material for investigation prevents a satisfactory examination of the *Galago* group in reference to the value of its subdivisions.

[2] A list of the generic, specific and subspecific names applied to African lemurs, with references to the original place of description, is given below (pp. 293, 299–303).

Lorisinæ

Perodicticus Bennett

1831. *Perodicticus* Bennett, Proc. Zool. Soc. London, September 1, p. 109; Philosoph. Mag., (2) X, p. 389. Type, by monotypy, *Perodicticus geoffroyi* Bennett = *Nycticebus potto* E. Geoffroy.

1840. *Potto* Lesson, 'Spec. Mamm.,' pp. 207, 237. Type, by monotypy and by tautonomy, *Potto bosmanii* Lesson = *Nycticebus potto* E. Geoffroy.

Specific and Subspecific Names Referable to *Perodicticus*

1788. *Lemur potto* Gmelin, in Linnæus, 'Syst. Nat.,' I, p. 42. Based exclusively on the "Potto" of Bosman. The diagnosis and the single citation are: "*L. caudatus subferrugineus, cauda unicolore.* Potto. Bosman. Beschrijv. van de Guin. Kust. II, p. 30, fig. 4. Habitat in Guinea."

1812. *Nycticebus potto* E. Geoffroy, Ann. Mus. Hist. Nat., Paris, XIX, p. 165. "Guinée." No definite locality. Based on "Potto. Bosman. Voy., p. 252, fig. 4." = *Lemur potto* Gmelin.

1820. *Galago guineensis* Desmarest, 'Mamm.,' I, p. 104. Substitute name for *Nycticebus potto* E. Geoffroy.

1831. *Perodicticus geoffroyi* Bennett, Proc. Zool. Soc. London, p. 109. Substitute name for *Nycticebus potto* E. Geoffroy.

1840. *Potto bosmanii* Lesson, 'Spec. Mamm.,' p. 238. Substitute name for *Nycticebus potto* E. Geoffroy.

1879. "*Perodicticus potto edwardsi* Bouvier, 'Guide du Naturaliste,' p. 1." (Not seen.) French Congo; no definite locality. "Type not in Paris Museum" (Elliot, 'Rev. Primates,' I, p. 42).

1902. *Perodicticus batesi* De Winton, Ann. Mag. Nat. Hist., (7) IX, January, p. 48. Benito River (15 miles from mouth), French Congo. Type, female skin and skull.

1910. *Perodicticus ibeanus* Thomas, Abstr. Proc. Zool. Soc. London, No. 81, March 22, p. 17; Proc. Zool. Soc. London, August, p. 536. Kakamega Forest, near Mt. Elgon, British East Africa. Altitude 6000 feet. Type, a young adult male, skin and skull.

1910. *Perodicticus ju-ju* Thomas, Ann. Mag. Nat. Hist., (8) V, April, p. 351. Southern Nigeria. No definite locality. Type, an adult male, skin and skull.

1910. *Perodicticus faustus* Thomas, Ann. Mag. Nat. Hist., (8) VI, October, p. 426. Irneti, Bompona, Maringa River, Northwestern Belgian Congo. Type, a subadult female, skin and skull.

1917. *Perodictius* [sic] *arrhenii* Lönnberg, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, p. 45. Masisi, west of Lake Kivu, Belgian Congo. Adult male skin and skull.

1917. *Periodicticus* [sic] *nebulosus* Lorenz, Ann. Naturhist. Hofmus., Wien, XXXI, p. 239. Ukaika, Ituri Forest. Type (unique) an adult male.

Perodicticus potto faustus Thomas

Plates LXXIX, LXXX

Perodicticus faustus Thomas, 1910, Ann. Mag. Nat. Hist., (8) VI, October, p. 426. Irneti, Bompona, Maringa River, northwestern Belgian Congo. Type and only specimen, a subadult female, skin and skull.

Perodicticus faustus Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 467. Belgian Congo: Medje (1), Poko (8 specimens).

Perodicticus arrhenii Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 154, part. States that specimens from "Haut Congo" and Panga, Stanleyville district, should be included in *arrhenii*. Panga lies within the area of Thomas' *P. p. faustus*.

The only form of *Perodicticus* collected by the American Museum Congo Expedition is represented by 37 specimens, of which 12 are adult males and 12 are adult females; 6 specimens are accompanied by skeletons; also one is in alcohol; collected as follows:

Niangara, 2 (adult ♂ and ♀), December 2, 19, 1910.
Rungu, 1 (young ♂), June 28, 1913.
Akenge, 6 (4 ♂, 2 ♀), September 29–October 29, 1913.
Niapu, 6 (all adult, 3 ♂, 3 ♀), November 16–December 22, 1913.
Medje, 18 (all adult but 3), April 15–September 28, 1910; April 23, June 24, 1914.
Avakubi, 3 (2 adult, 1 young), October 26, 1909; June 23, 1914.
Stanleyville, 1 (adult ♀), August 17, 1909.

The external measurements—average (minimum-maximum)—of twenty-one adults of *Perodicticus potto faustus*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
11 ♂	426(383–470)	352(322–383)	72(55– 90)	78(73–85)	26(25–29)
10 ♀	431(400–460)	356(325–385)	75(56–100)	78(70–86)	25(24–28)

The cranial measurements — average (minimum-maximum)—of twenty-four adults of *Perodicticus potto faustus* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
12 ♂	64.6(61.3–66.0)	63.5(58.7–66.2)	63.7(61.3–65.2)
12 ♀	63.2(60.0–66.7)	61.9(58.8–66.5)	62.3(58.8–66.6)

	Zygomatic Breadth	Interorb. Breadth	Postorb. Constr.
12 ♂	47.1(43.2–51.2)	11.0(10.0–12.3)	23.5(21.2–25.3)
12 ♀	46.3(42.2–50.0)	10.2(8.0–11.8)	22.1(20.0–24.6)

	Mastoid Breadth	Length Nasals	Upper Toothrow	Upper Molars
12 ♂	38.3(33.7–41.2)	16.2(14.3–19.2)	20.9(18.3–23.0)	8.7(7.8–9.5)
12 ♀	38.1(35.6–41.6)	16.2(14.0–19.0)	20.8(19.5–21.5)	8.8(7.6–9.8)

Sexual Variation.—It is evident from the above that there is no appreciable sexual difference in size in the present series of twenty-four adult specimens, in which the sexes are equally represented and all of comparable age, although the skull measurements show a slightly greater average for males.

INDIVIDUAL VARIATION IN CRANIAL CHARACTERS.—No. 52690, a senile male, has the shortest toothrow and next to the greatest zygomatic breadth of any of the males but is below the average in general size. The teeth are greatly worn, only the roots of the upper incisors, premolars and canines remaining, and the crowns of the molars are greatly worn. No. 52703, the largest of the males, is a middle-aged specimen in which the teeth are but little worn and the basal and parietal sutures are still unankylosed. Five young adult males (not included in the table of measurements), in which all the permanent teeth are present (the canines and some of the cheek-teeth not fully developed), have the greatest length of skull from 55.2 to 57.8 mm., or about 6 to 9 mm. less than in adults. In the largest female skull (No. 52692) the principal cranial sutures are all open, the teeth fully developed but unworn. The smallest female skull (No. 52700) has the cranial sutures obliterated and the teeth practically unworn. It is thus evident that the variation in cranial measurements is not due to age and is therefore individual.

The teeth vary greatly in size and details of structure in skulls of practically the same sex, age and dimensions. This is well shown in two females (Nos. 52711, 52712) collected at Niapu, November 28 and December 6, 1913. In No. 52712 the cheek-teeth are of about average size and form; in No. 52711 the upper molars are much larger than in the former, although the two skulls are of the same size and proportions, differing less than 2 mm. in any of the principal measurements. In No. 52712 the transverse axis of m^1 and m^2 forms a right angle to the axis of the toothrow. In many skulls it is directed more or less obtusely oblique to the axis of the toothrow, as in No. 52711, which is an extreme example of such divergence. The general outline of m^1 and m^2 is obtusely V-shaped in No. 52712, as it is in many other skulls of this series, but nearly as frequently the posterior corner of the inner heel is strongly developed, broadening backward and materially changing the inner outline of these teeth, especially of m^2, as in No. 52711, which is an extreme illustration of such modification. Other skulls of this series exhibit the intervening stages and show that Nos. 52711 and 52712 are merely extremes in a normal range of individual variation of the molar teeth.

AGE VARIATION.—In skulls of old individuals of both sexes the parietal ridges are a marked feature, and increase with age to the senile stage, as shown in No. 52690, a male from Medje, and in No. 52682, a female from Akenge. They begin to develop at the time the last permanent teeth appear and before the canines, p_3, and m^3 are fully developed. At no stage can the sexes be distinguished by any cranial feature, not even by the size of the canines. The zygomatic arches increase in thickness and in convexity with age, the skulls of young adults being slenderer and narrower than those of older individuals, in correlation with the progressive ossification of the skull.

INDIVIDUAL COLOR VARIATION.—In coloration the present series presents a wide range of variation, due largely to age and the condition of the pelage, but color variation is not to any appreciable extent related to locality.

IMMATURE PELAGE.—A single specimen (No. 51023, ♂, Medje, April 23, 1914), a nursling, is in first pelage (Pl. LXXX, fig. 2). (Total length, 155 mm.; tail, 28; hind foot, 38; greatest skull length, 35; posterior teeth still enclosed in the gum.) The entire body is white, the pelage soft and woolly, the tips of the hairs on the crown tinged with pale fawn; tail, wrists and ankles faintly smoke-gray; feet mummy-brown. No other specimen shows any trace of the first coat, the next in age being young adults with all the permanent teeth functionally developed.

ADULT PELAGE.—A series of five specimens, all from Medje, may be taken as illustrative of the striking range of color variation. Three of them are young adults, not quite mature as to size, with the canines and some of the cheek-teeth not fully grown, but all the teeth functional. The other two are old adults. It may be premised that the head and nape are more or less different in color from the rest of the upperparts in a larger proportion of the specimens, taking the entire series of more than thirty skins available for direct comparison, the two areas being often strongly contrasting; in others the whole upper surface is nearly uniformly colored. Another striking feature of variation is the presence or absence of white hair-tips from the shoulders posteriorly to the end of the tail and on the outside of the limbs.

A young adult male (No. 52699, Medje, May 28, 1910) has the cheeks and whole upper surface of the head and nape vandyke-brown in general effect, darker on the crown and sides of the head, paler on the nape, with a sprinkling of minute black hair-tips. A still darker zone of considerable breadth with a profusion of longer black hair-tips separates the head area from the back, which from the shoulders to the rump is prevailingly white, due to the abundance of long white hair-tips that dominate the general effect. The pelage is long and thick, and the individual hairs are slate-gray at base with a subbasal zone of pale russet, a broad subapical zone of deep black, and a still broader apical band of pure white. The average length of the pelage on the middle of the back is about 50 to 60 mm.; the basal half (the two lower color zones) is woolly, or "under-fur." The outside of the fore and hind limbs and the tail are similar in general color effect but the pelage is here much shorter and the several color zones much narrower. The chin and throat are brownish buff, contrasting with the rest of the ventral area and inside of limbs, which are superficially grayish white with a broad basal zone of slate-gray.

No. 52705 (♂, Medje, September 29, 1910) is an almost exact duplicate of the specimen above described as regards the coloration of the upperparts, but the ventral area and inside of limbs instead of being grayish white are strongly washed with pale tawny, deepest on the throat, foreneck and chest, the gular region not in strong contrast with the rest of the underparts.

No. 52704 (♂, Medje, September 20, 1910) has a profusion of broadly white-tipped hairs on the fore-back, but much fewer on lower back, rump and limbs. The head, nape and scapular region are dull whitish gray, sprinkled with long, stiff black hairs, with an irregular wash of dark brown on the cheeks, interorbital region, behind the ears, and over the shoulders. The gular region is faintly tawny, in contrast with the dull grayish white of the rest of the underparts. The difference between this specimen and the one last described may be due in large part to wear and fading, yet they are of practically the same age (as shown by the skulls), and both are males, taken at the same locality, the worn specimen nine days earlier than the other.

Middle-aged and old adults differ from the above-described specimens in being more uniformly colored, the pelage for the most part lacking the long white hair-tips and wholly woolly in character. Usually the head and nape area differs but little in general color from the back. Thus No. 52707 (♂, Medje, June 24, 1910) is almost entirely without the long white-tipped hairs of the three specimens described above, and the head and nape region are only a little paler than the back, through the absence of the narrow subapical blackish zone which gives a slight blackish tone to the back. On the head the hairs are uniformly colored to the basal slaty zone; on the back the long, conspicuous white hair-tips present in younger animals are reduced to minute points or wholly absent, and the subapical dark zone is sufficient to give only a slightly dusky tone to the general tint of reddish brown. On the occiput are scattered long bristly tactile hairs, mostly black but with a few white ones interspersed, while many have none. The underparts are dull grayish white.

No. 52692 (♀, Medje, March 11, 1910) is similar to the preceding but the pelage is less worn and the color tones much stronger, the upperparts being reddish brown darkened with blackish particularly on the crown and foreback, and the whole underparts are pale buff. On the middle of the back the hairs have short, glistening white tips. The long, scattered tactile hairs on the crown are white, and project 20 to 25 mm. above the general surface of the pelage. A few usually shorter black hairs are intermixed.

Most of the older adults fall between these two phases, varying in different individuals from the pale to the richly colored type. In some the glistening minute white tips of the hairs of the back are obsolescent, in others conspicuous. In the richer colored ones the pelage usually appears less worn than in the paler examples, so that it seems fair to infer that the color differences in the middle-aged and old adults are due in part to abrasion and fading.

Apparently no very large series of these animals has been previously available for study. Elliot, in describing *Perodicticus potto edwardsi* Bouvier, comments (1913, 'Rev. Primates,' I, (1912), p. 43) on this form as "a very variable species, examples from the same locality differing in this respect [color] from each other. There are six specimens of this Potto in the British Museum from the Benito and Ja rivers in the French Congo, West Africa, differing very considerably from each other in the hue and marking of their coats. The prevailing color above is black and chestnut red, but the underparts vary from dark gray mixed with red to ashy gray, and one mounted example from the Benito River, which however may have faded somewhat, has no black at all on the upperparts which are yellowish gray about the shoulders, becoming red on lower back and thighs." He adds that "The ends of the tails in some specimens are black as described by Bouvier." It may be noted that in some specimens the tail is wholly pale brown. In most specimens in the present Congo series the hairs of the end of the tail are black for the greater part of their length and tipped with white. Abrasion of the hairs at the end of the tail might easily give a black tip.

From the present large series from the Upper Congo examples can be selected that perfectly conform to Elliot's descriptions of the color characters of *Perodicticus potto, P. ju-ju* and *P. edwardsi,* and also with *P. arrhenii* Lönnberg. It is not to be assumed, however, that these names do not represent geographical forms, but it cannot be admitted that they are all well founded until large series from their respective type localities have been compared. I have however synonymized *P. arrhenii* in so far as specimens from Panga, Stanleyville District, are concerned. Lönnberg[1] considers them as belonging to his *arrhenii* and adds that this species "is distributed fairly widely in the great Congo forests."

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[1] 1919, Rev. Zool. Africaine, VII, p. 154.

The single specimen in the present collection from Stanleyville, an adult female, is a little below the average size of the present series as a whole, but in color characters can be perfectly matched by specimens from Medje, Akenge, and Niapu.

Perodicticus faustus Thomas was based on a young female from the Maringa River, about 300 miles west of Medje. Later the same author referred a series of nine specimens (one from Medje, eight from Poko) to the same form, without comment. As a large part of the present series was collected at Medje and the rest at neighboring localities all are here referred to *faustus*, which seems to be merely a subspecies of *P. potto*.

ARCTOCEBUS Gray

1863. *Arctocebus* Gray, Proc. Zool. Soc. London, p. 150. Type, by monotypy, *Perodicticus calabarensis* Smith.

SPECIFIC NAMES REFERABLE TO *Arctocebus*

1860. *Perodicticus calabarensis* Smith, Proc. Roy. Phys. Soc. Edinburgh, p. 172, figs. 1–4 (hands and head). Old Calabar, West Africa.

1902. *Arctocebus aureus* De Winton, Ann. Mag. Nat. Hist., (7) IX, January, p. 48. Benito River, 50 miles from mouth, French Congo. Type (and only specimen), skin and imperfect skull.

1913. *Arctocebus ruficeps* Thomas, Ann. Mag. Nat. Hist., (8) XII, October, p. 387. Metet, near the Nyong River, South Cameroon. Type, subadult female, skin and skull.

Galaginæ

GALAGO E. Geoffroy

1796. *Galago* E. Geoffroy, 'Mag. Encyclop.,' I, p. 49, Pl. I. Type, by tautonomy, *Lemur galago* G. Cuvier = *Galago senegalensis* E. Geoffroy.

1811. *Otolicnus* Illiger, 'Prodr. Syst. Mamm. et Avium,' p. 74. Type, by monotypy, "*Lemur galago* Schreber." Substitute name for *Galago* E. Geoffroy.

1811. *Macropus* G Fischer, Mém. Soc. Imp. Nat. Moscou, I, Ed. 2, p. 12, Pl. II. Type by monotypy and original designation, "le *Galago* d'Adanson" = *Galago senegalensis* E. Geoffroy. Hence *Macropus* is a new name for *Galago* E. Geoffroy, antedated by *Macropus* Shaw (1790) for a genus of Marsupials. Plate II carries the legend "*Macropus demidovii*," mentioned on p. 11 as "*Galago demidovii*," implying an earlier description of the species (not seen by me), as follows: "*Galago Demidovii*, nova species quadrimanorum, observatis anatomicis illustrata. Vide Acta Societatis physico-medicæ mosquensis. Tom. I. p. 57–59."

1854. *Chirosciurus* Gervais, 'Hist. Nat. Mamm.,' I, p. 159. Type, *Galago senegalensis*.

1859. *Otolemur* Coquerel, Rev. Mag. Zool., (2) XI, pp. 458–460, Pls. XVII, XVIII. Type, by monotypy, *Otolemur agisymbanus* Coquerel = a subspecies or synonym of *Galago crassicaudatus* E. Geoffroy.

1863. *Callotus* GRAY, Proc. Zool. Soc. London, pp. 132, 145. Type, by monotypy, *Callotus monteiri* Gray.

1863. *Otogale* GRAY, Proc. Zool. Soc. London, pp. 132, 139. Type, by subsequent designation (W. L. Sclater, 1900), *Otolicnus garnettii* Ogilby.

1863. *Euoticus* (subgenus of *Otogale*) GRAY, Proc. Zool. Soc. London, p. 140, Pl. XIX and text figure. Type, by monotypy, *Otogale pallida* Gray.

1872. *Sciurocheirus* GRAY, Proc. Zool. Soc. London, p. 857. Type, by monotypy, *Galago alleni* Waterhouse.

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Galago*

1796. *Galago senegalensis* E. GEOFFROY, 'Mag. Encyclop.,' I, pp. 38–41, Pl. I (animal and dentition). "Senegal," without definite locality. Based on a specimen collected by Adanson, who gave "Galago" as the native name.

1798. *Lemur galago* G. CUVIER, 'Tabl. Élémen. Hist. Nat. Anim.,' p. 101 = *Galago senegalensis* E. Geoffroy. Also named *Lemur galago* by Shaw in 1800 ('Gen. Zool.,' I, p. 108). There is no "*Lemur galago* Schreber, Säug., pl. XXXVIII B," repeatedly cited by authors. Pl. XXXVIII B was not published till 1804 (fide Sherborn), is legended "*Galago senegalensis*," and is a copy of Geoffroy's. Wagner cites "*Lemur galago* Schreb. tab. XXXVIII B." *Lemur galago* has also been erroneously attributed to Gmelin.

1806. *Galago geoffroyi* G. FISCHER, Mém. Soc. Imp. Nat. Moscou, I, p. 25. (Not seen.) Substitute name for *Galago senegalensis* E. Geoffroy.

1812. *Galago crassicaudatus* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, XIX, p. 166. No specimen mentioned; type locality unknown. "Type in Paris Museum" (Elliot, 1913, 'Rev. Primates,' I, (1912), p. 55).

1836. *Galago moholi* A. SMITH, 'App. Rept. Exped. Explor. South Africa,' June, p. 42; 1849, 'Illustr. Zool. South Africa,' Mamm., text and Pls. VIII (animal) and VIII bis (anatomy). Limpopo River, South Africa (lat. 25° S.). Nine specimens.

1837. *Galago alleni* WATERHOUSE, Proc. Zool. Soc. London, October 3, p. 87. Fernando Po, West Africa.

1838. *Otolicnus garnettii* OGILBY, Proc. Zool. Soc. London, July, p. 6. Port Natal, Southeast Africa.

1840. *Galago acaciarum* LESSON, 'Spec. Mamm.,' p. 246. New name for *Galago senegalensis* E. Geoffroy.

1842. *Otolicnus teng* SUNDEVALL, Kungl. Sven. Vet. Ak. Handl., Stockholm, p. 201. (Not seen.)

1850. *Galago conspicillatus* I. GEOFFROY, Compt. Rend. Ac. Sci. Paris, XXXI, p. 876; 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 81. Port Natal. Type, a male.

1855. *Otolicnus galago, α sennariensis* WAGNER, Schreber's 'Säugthiere,' Suppl., V, p. 158. New name for *Otolicnus teng* Sundevall. There is no "*Galago acaciarum* var. C. *sennaariensis* Lesson" as cited by Elliot (1913, 'Rev. Primates,' I, (1912), pp. 47, 74). Lesson indicated a "var. C" but did not give it a technical name.

1855. *Otolicnus galago* var. *australis* WAGNER, Schreber's 'Säugthiere,' Suppl., V, p. 158. New name for *Galago moholi* A. Smith.

1857. *Microcebus elegantulus* LE CONTE, Proc. Ac. Nat. Sci. Philadelphia, p. 10 "Western Africa [Du Chaillu Coll.] = French Congo."

1859. *Galago murinus* MURRAY, Edinburgh New Philos. Journ., (new ser.) X, pp. 243–251, Pl. XI. Old Calabar, West Africa. Type, a specimen in spirits.

1859. *Otolemur agisymbanus* COQUEREL, Rev. Mag. Zool., (2) XI, p. 459, Pls. XVII (animal), XVIII (skull). Agisymbana Island, East Africa. Type, a skin and skull.

1860. *Otolicnus apicalis* DU CHAILLU, Proc. Boston Soc. Nat. Hist., VII, November, p. 361. French Congo, "mountains of the interior near the equator."

1863. *Callotus monteiri* (*ex* Bartlett Mss.) GRAY, Proc. Zool. Soc. London, p. 145. *Galago monteiri* Bartlett, idem, p. 231, Pl. XXVIII; P. L. Sclater, idem, 1864, p. 711. Cuio Bay, south of Loanda, Angola, West Africa.

1863. *Galago allenii* var. *gabonensis* GRAY, Proc. Zool. Soc. London, p. 146. Gaboon, West Africa. Type, a skin and skull.

1863. *Otogale pallida* GRAY, Proc. Zool. Soc. London, p. 140, Pl. XIX. Fernando Po, West Africa. Type, a skin and skull.

1864. *Otogale crassicaudata* var. *kirkii* GRAY, Proc. Zool. Soc. London, p. 456. Quilimane, Mozambique. Type, a skin and skull.

1876. *O.* [*tolicnus*] *mossambicus* PETERS, Monatsb. Ak. Wiss. Berlin, p. 473, footnote = *O. senegalensis* Peters of earlier date. Mozambique.

1876. *Otolicnus alleni cameronensis* PETERS, Monatsb. Ak. Wiss. Berlin, p. 472. Aqua Town, Cameroon.

1876. *Galago lasiotis* PETERS, Monatsb. Ak. Wiss. Berlin, p. 912. Mombasa, East Africa. Young male, last (third) molars still in alveoli.

1893. *Galago zanzibaricus* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 111. Mojoni, Zanzibar. Three specimens.

1901. *Galago gallarum* THOMAS, Ann. Mag. Nat. Hist., (7) VIII, July, p. 27. Webi Dau, Boran Galla Country. Type, a skin and skull; also a paratype from Lake Stephanie, altitude 3000 feet.

1905. *Otolemur panganiensis* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 278. Aruscha, near Mount Kilimanjaro. Type, a female.

1905. *Otolemur badius* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 277. Ugalla River, German East Africa. Type, a skin and skull; sex not indicated.

1907. *Galago granti* THOMAS AND WROUGHTON, Proc. Zool. Soc. London, August, p. 286. Coguno, Inhambane, South Africa. Type, an adult male, skin and skull.

1907. *Galago zuluensis* ELLIOT, Ann. Mag. Nat. Hist., (7) XX, September, p. 186. Zululand, Southeast Africa. No definite locality. Type, a skin and skull (sex not given); no other specimen mentioned.

1907. *Galago hindei* [sic] ELLIOT, Ann. Mag. Nat. Hist., (7) XX, September, p. 186. = *Galago hindsi* Elliot (1913, 'Rev. Primates,' I, (1912), p. 62). Kitui, Athi River, British East Africa. Altitude 3500 feet. Type, a skin and skull (sex not stated), and a paratype.

1907. *Galago braccatus* ELLIOT, Ann. Mag. Nat. Hist., (7) XX, September, p. 187. Mount Kilimanjaro, East Africa. Type (and only specimen mentioned), a skin and skull, sex not stated.

1907. *Galago gabonensis batesi* ELLIOT, Ann. Mag. Nat. Hist., (7) XX, September, p 187. Como River, Gaboon, West Africa. Type (and only specimen mentioned), a skin and skull (sex not indicated).

1907. *Galago nyasæ* Elliot, Ann. Mag. Nat. Hist., (7) XX, September, p. 188. Mountains south of Lake Nyasa, East Africa. Type, a skin and skull (sex not indicated); another specimen in alcohol from Zomba, Nyasaland.

1909. *Galago braccatus albipes* Dollman, Ann. Mag. Nat. Hist., (8) IV, December, p. 549. Kirui, Elgon, British East Africa. Altitude 6000 feet. Type, an adult male, skin and skull.

1910. *Galago elegantulus tonsor* Dollman, Ann. Mag. Nat. Hist., (8) V, January, p. 94. Fifteen miles from mouth of Benito River, Spanish Guinea, West Africa. Type, an adult female, skin and skull. Also one topotype and two specimens from Efulen, Cameroon.

1910. *Galago dunni* Dollman, Ann. Mag. Nat. Hist., (8) V, January, p. 92. Fafan, 35 miles east of Harrar, Somaliland. Type, an old male, skin and skull.

1910. *Galago talboti* Dollman, Ann. Mag. Nat. Hist., (8) V, January, p. 93. Nkami, Southern Nigeria. Type, an adult male, skin and skull.

1910. *Galago pupulus* Elliot, Ann. Mag. Nat. Hist., (8) V, January, p. 77. Yola, Nigeria. Type (and only specimen), an adult male, skin and skull.

1912. *Galago moholi cocos* Heller, Smithsonian Misc. Coll., LX, No. 12, November, p. 1. Mazeras, British East Africa. Type, an adult male, skin and skull, and five topotypes.

1912. *Galago (Otolemur) kikuyuensis* Lönnberg, Ann. Mag. Nat. Hist., (8) IX, January, p. 64. Escarpment Station, British East Africa.

1913. *Galago argentatus* Lönnberg, Ann. Mag. Nat. Hist., (8) XI, p. 167. Ukina, near Schirati, east of Victoria Nyanza. Type, an old male, skin and skull.

1917. *Galago crassicaudatus umbrosus* Thomas, Ann. Mag. Nat. Hist., (8) XX, July, p. 49. Tzaneen Estate, Zoutpansburg District, northern Transvaal. Type, an old female, skin and skull.

1920. *Galago sotikæ* Hollister, Smithsonian Misc. Coll., LXXII, No. 2, January 22, p. 1. Telek River, Sotik, British East Africa. Type, an adult male, skin and skull. Also two topotypes.

GALAGOIDES A. Smith

1833. *Galagoides* A. Smith, South African Quart. Journ., (2) II, December, p. 32. Type, by subsequent designation (Elliot, 1913, 'Rev. Primates,' I, (1912), p. xxix), *Galago demidoffii* G. Fischer. *Galagoides* contained two species, (1) *Galago senegalensis* E. Geoffroy (type of *Galago*) and (2) *Galago demidoffii* G. Fischer.

1857. *Hemigalago* Dahlbom, Zool. Studier, I, Tredje Heft, pp. 224, 230, Pl. x. Type, by monotypy, *Galago demidoffii* G. Fischer.

Specific and Subspecific Names Referable to *Galagoides*

1798. *Lemur minutus* G. Cuvier, 'Tabl. Élémen. Hist. Nat. Anim.,' p. 101. Senegal. Unidentifiable. The entire description consists of six words: "Gris de souris, à petites oreilles." The context implies that Senegal is the habitat. Some authors have synonymized the species with *Galago demidoffii* G. Fischer, described eight years later.

1806. *Galago demidoffii* G. Fischer, "Mém. Soc. Imp. Nat. Moscou, I, p. 24, fig. animal." (Not seen.) "Senegal," without definite locality. In the second edition of this volume of the Mémoirs (1811, p. 11 and on the plate) the specific name is spelled *demidovii*. (See above under the generic name *Macropus*.)

1806. *Galago cuvieri* G. FISCHER, "Mém. Soc. Imp. Nat. Moscou, I, 1806, p. 23." (Not seen.) New name for *Lemur minutus* G. Cuvier. Recognized by Fitzinger (1870) as a distinct species allied to *Galago demidoffii* G. Fischer.

1840. *Mioxicebus rufus* LESSON, 'Spec. Mamm.,' p. 219. The "habitat" is erroneously given as "L'île de Madagascar." New name for *Galago demidoffii* G. Fischer.

1853. *Octolicnus* [sic] *peli* TEMMINCK, 'Esquiss. Zool.,' p. 42. Dabocrom, coast of Guinea. Three specimens, adult male, adult female, semi-adult female.

1876. *Otolicnus pusillus* PETERS, Monatsb. Ak. Wiss. Berlin, p. 473. Dongila, Gaboon. Based on two specimens.

1893. *Galago* (*Hemigalago*) *anomurus* POUSARGUES, Bull. Soc. Zool. France, XVIII, p. 51; Nouv. Arch. Mus. Hist. Nat., Paris, (3) VI, pp. 157–167, Pl. II (animal). Upper Kemo River, right affluent of the Ubangi, French Congo. Type, adult male, skin and skull; also a female paratype.

1904. *Galago demidoffi poensis* THOMAS, Abstr. Proc. Zool. Soc. London, No. 10, November 22, p. 12; idem, II, April, p. 186. Bantabiri (altitude 1800 m.), Fernando Po, West Africa. Type, an adult male, skin and skull, and three topotypes.

1907. *Galago* (*Hemigalago*) *thomasi* ELLIOT, Ann. Mag. Nat. Hist., (7) XX, September, p. 189. Fort Beni, Semliki River, on the boundary line of Uganda and Belgian Congo. Type, a skin and skull (sex not stated). A second specimen from Dumo, Uganda.

1915. *Hemigalago demidoffi medius* THOMAS, Ann. Mag. Nat. Hist., (8) XVI, December, p. 466. Poko, Belgian Congo. Type, a male, skin and skull; also 9 paratypes from Poko and 2 paratypes from Medje, Belgian Congo.

1917. *Galago matschiei* LORENZ, Ann. Naturhist. Hofmus., Wien, XXXI, p. 237. Moēra, Ituri Forest. Three adult males, skins and skulls.

Galagoides[1] **demidoffi medius** (Thomas)

Plate LXXXI

Galago demidoffi THOMAS, 1888, Proc. Zool. Soc. London, p 5. Monbuttu (2 specimens).

Hemigalago demidoffi ELLIOT, 1913, 'Rev. Primates,' I, (1912), p. 82 (part; Monbuttu).

Hemigalago demidoffi medius THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 466. Type, a male, skin and skull, from Poko; also 9 paratypes from Poko and 2 paratypes from Medje, Belgian Congo.

Hemigalago demidoffi medius LÖNNBERG, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, p. 47. Masisi, west of Lake Kivu (1 specimen).

Represented by 29 specimens (26 skins and skulls and 4 in alcohol), of which 23 are adult and 6 immature, collected as follows:

Niangara, 7 (2 young ♂, 5 adult ♀), November 10–December 19, 1910.

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[1] For the use of *Galagoides* in place of *Hemigalago* see above, p. 292.

Akenge, 1 (adult ♂), October 31, 1913.

Niapu, 1 (young ♂), December 7, 1913.

Medje, 16 (9 adult and 4 young ♂, 3 adult ♀), January 23–25, August 3, October 11, 1910; March 24, June 1, July 8, 1914.

Avakubi, 2 (adult ♂ and ♀), October 15, 1909; October 12, 1913.

Stanleyville, 2 (1 adult ♀, skin and skull, and 1 in alcohol), August 25, 1909; December 16, 1914.

The external measurements—average (minimum-maximum)—of nineteen adults of *Galagoides demidoffii medius*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
11 ♂	297(264–349)	122(106–138)	176(156–211)	47(40–54)	25(22–28)
8 ♀	325(272–354)	138(113–161)	186(157–200)	50(45–53)	27(24–29)

The cranial measurements—average (minimum-maximum)—of nineteen adults of *Galagoides demidoffii medius* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
11 ♂	36.3(33.0–39.0)	31.4(29.6–34.0)	35.7(33.8–37.7)
8 ♀	38.0(34.9–39.5)	34.0(29.8–38.6)	37.7(34.0–39.1)

	Zygomatic Breadth	Interorb. Breadth	Postorb. Constr.
11 ♂	22.1(20.8–23.5)	4.1(3.8–4.4)	14.6(13.0–15.7)
8 ♀	23.1(21.0–24.0)	4.3(3.6–5.0)	15.3(14.1–15.9)

	Mastoid Breadth	Breadth at m^3	Upper Toothrow	Upper Molars
11 ♂	19.0(17.8–20.4)	10.8(10.0–12.3)	11.7(11.0–12.4)	5.1(4.8–5.5)
8 ♀	19.8(18.3–20.6)	11.7(10.8–12.5)	12.5(10.8–13.5)	5.5(4.7–5.8)

Sexual Variation.—These measurements indicate no distinctive difference in size between males and females in a series of nineteen fully adult individuals. The permanent dentition is mature in all, and the basal sutures are closed in all but two of the males and three of the females. In these five skulls the braincase sutures are still entirely open, the fronto-parietal and occipital sutures remaining unclosed even after the basi-occipital suture has become obliterated by ankylosis. Even when the permanent teeth are fully developed the parietal bones become detached by slight maceration in cleaning the skull. The temporal ridges are weak and only slightly indicated even in old adults.

Individual Variation in Cranial Characters.—The cranial measurements demonstrate a considerable amount of individual variation in size, in relative proportion of parts, in length of the toothrow and the size of the teeth. In general it may be said that the variation in size in the present series covers the whole range in size variation shown in the published measurements of the hitherto recognized forms of the *demi-*

doffii group, except *thomasi* of Elliot, based on two Uganda specimens, which slightly exceed the maximum of the present series, the greatest skull-length in *thomasi* being recorded as 40–41 mm. as against a maximum of 39–39.5 in the present Congo series.

Immature Pelage.—Two specimens are in first pelage and a third is in transition to adult pelage. The youngest (No. 51369, ♂, Medje, March 24, 1914) has a total length of 142 mm.; tail length, 72; hind foot, 25; greatest skull length, 24. The cusps of the deciduous teeth are visible in the cleaned skull (probably not through the gum in life). The ventral area and inside of limbs are naked. The dorsal surface and tail are covered with fine soft hair, dark brown with blackish tips; upper surface of limbs nearly naked and dark brown; ears blackish. A broad hair-whorl at middle of shoulders, the hair immediately in front of which is directed forward. An older specimen (No. 50970, ♂, Medje, March 24, 1914) has the first pelage well developed, clothing the whole body and limbs (Pl. LXXXI, fig. 4). Total length, 175; tail, 96; hind foot, 32; greatest length of skull, 53. Milk teeth well above the gum. Postpectoral area and inside of limbs pale yellowish; throat, fore neck and chest grayish white, in contrast with the rest of the lower surface. Upper surface and tail dull brown, with conspicuously longer and darker hair-tips; interorbital space and outside of limbs dark grayish brown. The hair-whorl at shoulders less conspicuous than in the younger specimen, but nape-hairs distinctly directed forward. A third specimen (No. 50969, ♂, Medje, June 1, 1914) is much older, and has practically acquired the texture and coloration of the darker colored adults. Total length, 188; tail, 117; hind foot, 36; greatest length of skull, 53. Teeth about as in No. 50970. The pelage is everywhere full and soft, the coloration nearly as in the more rufous colored adults.

Color Variation in Adults.—Adults present a considerable range of variation in color (wholly independent of sex), from dull grayish drab (darker along midline of back) on upperparts and a dark grayish black tail, to a dull rufous brown, frequently (not always) including the tail. The underparts are pale yellowish (about cream color) in the drab phase, a little more intense medially, to buff in the rufous-brown phase. The tail varies in this latter phase from a rufous tone uniform with the back to blackish. These variations are independent of locality and are connected by intermediates of every grade. Young adults tend to brighter tones than those shown by old adults.

Nearly all of the specimens were obtained within twenty to one hundred miles of the type locality of Thomas' *Hemigalago demidoffi* *medius*, and more than half of the series from Medje, a locality from which two paratypes were recorded. There is hence little chance of error in referring all of the present series of specimens to *medius*. The two Stanleyville specimens are indistinguishable from the others as regards essential characters.

SUBORDER ANTHROPOIDEA

LASIOPYGIDÆ

Lasiopyginæ

GENERIC NOMENCLATURE OF AFRICAN BABOONS

Eleven names have been proposed for generic or subgeneric groups of African baboons, of which four were invalid by preoccupation when proposed (*Cynocephalus* Cuvier and Geoffroy, 1795; *Mormon* Wagner, 1839; *Hamadryas* Lesson 1840; *Maimon* Trouessart, 1904). Four are synonyms of earlier names (*Mandril* Voigt, 1831; *Chæropithecus* "Blainville" [=Gervais and Sénéchal], 1839; *Gelada* Gray, 1843; *Drill* Reichenbach, 1862). The three valid names are (1) *Papio* Erxleben, 1777,[1] (2) *Mandrillus* Ritgen, 1824, (3) *Theropithecus* I. Geoffroy, 1843.

Most of these names have been used, with varying restrictions and meanings by different authors, as subgenera of either *Papio*, *Cynocephalus*, or *Chæropithecus*. The *gelada* group is now currently recognized as a genus (*Theropithecus*), and all other baboons are referred to *Papio*, usually with four subgenera (Trouessart, 1897–1904, Elliot, 1913), for three of which invalid names are employed. The mandrills, however, are separable from *Papio* (*s.s.*) as a genus, and apparently the hamadryads or tartarins should also be recognized as a group of generic rank.

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[1] *Papio* "Brisson" (Haak) and *Papio* Erxleben

Papio "Brisson" [=Haak], 1762, 'Regn. Anim.,' Quadrup., Stirps III, p. 136. Type, by monotypy, *Papio papio*, Le Babouin.

In this, the first reference is: "Linn. Syst. Nat. Ed. 6. g. 2. sp. 5." Other citations include: "Raj. Syn. Quadr. p. 158," and the three additional authors cited by Linnæus in the sixth and tenth editions of his 'Syst. Nat.' under *Simia sphinx* and also his diagnosis of *Simia sphinx*.

The citations include all monkeys with a short tail ("Eæ quæ caudam habent brevissimam"), in contrast, on the one hand, with the tailless species ("Simia" and "Simia cynocephala") and, on the other hand, those having a long tail ("Eæ quæ caudam habent longam, & rostrum breve. Cercopithecus"). His diagnosis indicates a short-tailed baboon, with "Habitat in Indiæ solitudinibus," which, as indicated by his citations, evidently includes Africa as well as tropical Asia. (The copy of Brisson—octavo edition, 1762—here used was formerly Boddaert's; it is annotated with additional references, including Linnæus' tenth edition of the 'Syst. Nat.' In Boddaert's handwriting under *Papio* is added: "Linn. Syst. Nat. ed. 10, g. 2, sp. 3. Sphinx").

From the above it would appear that Brisson's *Papio papio* is not only composite, but if restricted in accordance with modern usage should be synonymized with *Simia sphinx* Linnæus, now commonly accepted as the mandrill. If the genus *Papio* Brisson were transferred to the mandrill, it would preoccupy *Papio* Erxleben and produce great confusion in the nomenclature of the baboons. It seems best therefore to regard *Papio* Brisson as nomenclaturally non-existent, and to accept *Papio* Erxleben, with *Papio sphinx* Erxleben (not *Simia sphinx* Linnæus =*Cynocephalus papio* Desmarest) as genotype, as currently accepted. Furthermore, Brisson appears to have also described the mandrill under his "Stirps V" (p. 152, 1762 Ed.) as species " 3, *Cercopithecus Cynocephalus* naso violaceo. . . . Le Magot, ou Tartarin." This should preclude the use of *Papio* Brisson for the mandrill.

Erxleben cites under *Papio sphinx* all the references given by Brisson and many others, including the sixth, tenth, and twelfth editions of Linnæus' 'Syst. Nat.,' and the references to *Simia sphinx* of the tenth and twelfth editions.

All relate to the baboon, among them being "Le Papion ou Babouin proprement dit Buff. hist. nat. XIV, p. 133," and also "Grand Papion" and "Petit Papion," "Buff. hist. nat. XIV tab. 13, tab. 14 fig. bon." His species 2, *Papio maimon*, is the *Simia maimon* Linnæus, 1766. This is of course on the basis of Elliot's determination (1909, Ann. Mag. Nat. Hist., (8) IV, November, p. 417) of *Simia sphinx* Linnæus, approved later by Thomas (1911, Proc. Zool. Soc. London, p. 126), and of some earlier authors.

D. G. Elliot recognized in his 'Review of the Primates,' 1913 (1912), II, pp. 115–154, four subgenera of the genus *Papio*, placed in the following sequence: (1) *Chæropithecus*, with nine species; (2) *Papio*, with four species; (3) *Hamadryas*, with two species and an additional subspecies; (4) *Mormon*, with three species. He correctly gave *Papio sphinx* Erxleben (not Linnæus = *Cynocephalus papio* Desmarest) as the type of the genus *Papio*, but by a strange lapsus[1] placed this species in the subgenus *Chæropithecus*. He gave no genotype for any of his four subgenera, a practice followed throughout his great work on the Primates, as well as elsewhere, not recognizing this (as he informed me orally in 1914) as necessary, or that they should have the same validity as genera.

Chæropithecus "Blainville" (= Gervais and Sénéchal) was founded especially for "les Cynocéphales," and is thus equivalent to the earlier, preoccupied *Cynocephalus* Cuvier and Geoffroy (1795), a synonym of *Papio* (*s.s.*). Elliot, however, made *Simia cynocephalus* Linnæus the first species under his subgenus *Papio*, as did Trouessart (1904) before him. As the names adopted by Elliot for his other subgenera (*Hamadryas* and *Mormon*) are invalid by preoccupation, it thus happens that all of Elliot's designations for his subgenera of *Papio* are untenable. Trouessart ('Cat. Mamm.,' 1897 and 1904) had made about the same division of *Papio* into four subgenera.

PAPIO Erxleben

1777. *Papio* Erxleben, 'Syst. Reg. Anim.,' p. 15. Type, by subsequent designation (Palmer, 1904), *Papio sphinx* Erxleben (not Linnæus = *Cynocephalus papio* Desmarest 1820).

1795. *Cynocephalus* Cuvier and Geoffroy, 'Mag. Encyclop.,' III, p. 462. Type, by tautonomy, *Simia cynocephalus* Linnæus. Preoccupied by *Cynocephalus* Boddaert (1768) for a genus of insectivores, and by *Cynocephalus* Walbaum (1792) for a genus of fishes.

1839. *Chæropithecus* (subgenus of *Simia*) Gervais (*ex* Blainville, orally). 'Dict. Pittoresque Hist. Nat.,' VIII, p. 90, "Les Cynocéphales." Type, *Simia cynocephalus* Linnæus. Also Sénéchal, idem, p. 428, in the same sense. Apparently nowhere adopted by Blainville in any of his publications. As stated by Palmer (1904, 'Index Gen. Mamm.,' p. 186, footnote): "Blainville, Ostéog., I, Primates, 30, 31, 1839, merely refers to *Choiropithecus* as used by classical writers, without adopting the name." Gervais states (*loc. cit.*) that Blainville had employed for a long time "le mot latin *pithecus*" to indicate "toutes les espèces du genre *Simia* de Linné qui vivent dans l'Ancien-Monde, et il le fait entrer comme racine dans la composition de tous les noms de sous-genre que renferme cette partie de l'ordre des Primates. C'est ainsi que les Guenons s'appellent comme dans la méthode d'Erxleben *Cercopithecus;* les espèces à corps grêle, *Semnopithecus;* les Macaques, comprenant le Magot, *Cynopithecus;* les Cynocéphales, *Chæropithecus*, etc." Blainville in a note entitled 'Distribution géographique des quadrumanes' (1839, Echo du Monde Savant, V, January, pp. 19, 20) used (*loc. cit.*, p. 20) the following group names in the plural form: *Brachio-pitheci* for the "orang-outangs et gibbons"; *Cynopitheci* for the "macaques"; *Chæropitheci* for the "cynocéphales ou singes à narines terminales," including *Macacus gelada* Rüppell. *Chæropithecus* Blainville is thus a synonym of *Papio* Erxleben , as well as of *Cynocephalus* Cuvier and Geoffroy, invalid by preoccupation.

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[1] [It evidently escaped Dr. Allen's notice that this error was corrected by Elliot in his introduction (1913, 'Rev. Primates,' I, (1912), pp. lv and lvi). Thus *Chæropithecus* (*loc. cit.*, II, p. 125) is replaced by *Papio* and *Papio* (*loc. cit.*, II, p. 137) is replaced by *Cynocephalus*; *Chæropithecus* being entirely eliminated as a subgenus. Elliot's subgenera thus have the following sequence: (1) *Papio*, (2) *Cynocephalus*, (3) *Hamadryas*, (4) *Mormon*, the number of species and subspecies remaining numerically the same as given by Dr. Allen above.—H. L.]

1862. *Choiropithecus* (subgenus of *Cynocephalus*) Reichenbach, 'Vollständ. Naturg. Affen,' p. 151. Type, by monotypy, *Simia porcaria* Boddaert. Emendation of *Chæropithecus* Gervais and Sénéchal.

1913. *Chæropithecus* (subgenus of *Papio*) Elliot, 'Rev. Primates,' II, (1912), p. 125. No type designated. Includes nine species, one of which (*Papio papio*) is the species he gives as the type of the genus *Papio*.

1913. *Papio* (subgenus of *Papio*) Elliot, 'Rev. Primates,' II, (1912), p. 137. No type designated. Includes four species, but not the genotype of *Papio!*

Specific and Subspecific Names Referable to *Papio*

1766. *Simia cynocephalus* Linnæus, 'Syst. Nat.,' I, p. 38. Diagnosis: "S. caudata imberbis flavescens, ore producto, cauda recta natibus calvis." Habitat in Africa. Simillima S. Inuo, sed caudata." The citations are: "Briss. quadr. 213. Jonst. quadr. t. 59. f. ultima. Alp. ægypt. t. 16." = *Cynocephalus babouin* Desmarest (1820), or the "Yellow Baboon" of later authors, as based on Brisson and Buffon. It is also the *Papio sphinx* of E. Geoffroy (1812), and the *Cynocephalus sphinx* of many other later authors.

1777. *Papio sphinx* Erxleben (not of Linnæus), 'Syst. Reg. Anim.,' p. 15. "Habitat in calidissimis Africæ Indiaque." = *Cynocephalus babouin* Desmarest (1820).

1787. *Simia porcaria* Boddaert, Naturforscher, XXII, pp. 17–22, Pl. i, figs. 1, 2. "Habitat in Africa."

1792. *Papio variegata* Kerr, 'Anim. Kingd.,' p. 62, No. 18. = Yellow Baboon of Pennant, 'Hist. Quad.,' No. 80.

1800. *Simia sylvicola* Shaw, 'Gen. Zool.,' I, Mamm., p. 22. = "Wood Baboon. Pennant Quadr., p. 191, pl. 42." No locality.

1800. *Simia sublutea* Shaw, 'Gen. Zool.,' I, Mamm., p. 23. = "Yellow Baboon. Pennant Quadr. p. 191."

1804. *Simia sphingiola* Hermann, 'Obs. Zool.,' I, p. 2. = *Simia porcaria* Boddaert.

1812. *Papio comatus* E. Geoffroy, Ann. Mus. Hist. Nat. Paris, XIX, p. 103. "Habite le cap de Bonne-Espérance." Cites "*Simia sphingiola* Schreber, fig. 6 *B*." = *Simia porcaria* Boddaert.

1820. *Cynocephalus papio* Desmarest, 'Mamm.,' I, p. 69. Based on the "Papion, Buff. tom. 14. pl. 13" and Le Papion, F. Cuvier and Geoffroy Saint-Hilaire, 1819, 'Hist. Nat. Mamm.,' I, livr. VI-VII, 2 color Pls. (♂ and ♀). "Patrie. La côte de Guinée."

1820. *Cynocephalus babouin* Desmarest, 'Mamm.,' I, p. 68. = Le Babouin F. Cuvier and Geoffroy Saint-Hilaire, 1818, 'Hist. Nat. Mamm.,' I, livr. IV. Without locality.

1829. *Simia anubis* Fischer, 'Synop. Mamm.,' p. 33. = "Le Cynocéphale Anubis," F. Cuvier and Geoffroy Saint-Hilaire, 1825, 'Hist. Nat. Mamm.,' III, livr. L, and color Pl. (animal), June. "Africa" = ?Meroë Island, Upper Nile (cf. Anderson, 1902, 'Zool. Egypt,' Mamm., pp. 34–53, Pl. IV (animal), Pl. VI (skull).

1839. *Cynocephalus ursinus* Wagner, Schreber's 'Säugthiere,' Suppl. I, (1840), p. 162, Pl. VIII *B*; idem, 1855, V, p. 65. Specimen from Cape Colony, South Africa, described. Cites *Simia porcaria* Boddaert and *S. comatus* E. Geoffroy as synonyms. Also Schreber, Pl. VIII *B*, a copy of Boddaert's. = *Simia porcaria* Boddaert renamed.

1843. *Cynocephalus choras* Ogilby, Proc. Zool. Soc. London, p. 12 (in text). "The individual which I am now about to describe was brought from the Niger Expedition, and presented to the Society by Lieutenant Webb, R.N. It is a semiadult male."

1843. *Cynocephalus thoth* Ogilby, Proc. Zool. Soc. London, p. 11. Described from a living animal "in the Society's Gardens," from an unknown locality.

1848. *Cynocephalus olivaceus* I. Geoffroy, Ann. Mus. Hist. Nat. Paris, p. 543; 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 34. Based on an immature male from Gulf of Benin, Guinea, living in the Paris Menagerie.

1853. *Papio rubescens* Temminck, 'Esquiss. Zool.,' p. 39. Based on an immature specimen. "Patrie. Habite l'Afrique occidentale mais on ignore quelle partie de cette grande étendue des côtes."

1856. *Cynocephalus doguera* Pucheran, Rev. Mag. Zool., Paris, (2) VIII, p. 96; idem, 1857, (2) IX, pp. 250–252. Preliminary diagnosis of eight words (*loc. cit.*, 1856). A fuller description in 1857 (*loc. cit.*). Type, a male from Abyssinia, without definite locality. "Le Doguera habite, en troupes nombreuses, de mille à deux mille individus, les hautes montagnes du Sémen, séjournant, ainsi, à une élévation de 8 à 10,000 pieds au-dessus du niveau de la mer. . . Le Cynocéphale Doguera est, en Abyssinie, l'homologue du Chacma." Skull figured by Anderson, 1902, 'Zool. Egypt,' Mamm., Pl. VII (nat. size).

1892. *Cynocephalus langheldi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 233. Type a young female from eastern slope of the Unguru Mountains, German East Africa.

1893. *Papio thoth ibeanus* Thomas, Ann. Mag. Nat. Hist., (6) XI, January, p. 47. Type, an adult male, skin and skull from Lamu, British East Africa.

1896. *Papio pruinosus* Thomas, Proc. Zool. Soc. London, pp. 789–790, Pl. XXXVIII (animal). Type, an adolescent male from Lesumbwe, Monkey Bay, south end of Lake Nyasa. "Distinguished at the first glance from every other species [of baboon] by its hoary colour, white belly, and unannulated fur." Skull figured by Anderson, 1902, 'Zool. Egypt,' Mamm., Pl. XIV (nat. size).

1897. *Papio neumanni* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 161. Type, skin and skull of a young male, from Donyo Ngai; also a skull of an old male from "Kilonito," Natron Lake, German East Africa. "Type" skull figured by Anderson, 1902, 'Zool. Egypt,' Mamm., Pl. viii (nat. size).

1898. *Papio heuglini* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, pp. 80–81. An old male and a young female and another young specimen from "Bahr el Abiad, Bahr el Azrek und Atbara," Sudan. Type skull (Shilluk Island) figured by Anderson, 1902, 'Zool. Egypt,' Mamm., Pl. v (nat. size).

1900. *Papio yokoensis* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 89. Type an adult male skin and skull from "Yoko am Sanaga, Hinterlande von Kamerun."

1902. *Papio lydekkeri* Rothschild, Novit. Zool., Tring, IX, p. 140. Briefly indicated. Type an adult female from "Upper Nile." = *Papic heuglini* Matschie (1898).

1902. *Papio anubis* subsp. *olivaceus* De Winton, in Anderson, 'Zool. Egypt,' Mamm., p. 53, part. Not *Cynocephalus olivaceus* I. Geoffroy = *Papio papio.*

1907. *Papio strepitus* Elliot, Ann. Mag. Nat. Hist., (7) XX, September, p. 194. Two specimens. Type an adult skin and skull from Fort Johnston, south end of Lake Nyasa. "The species bears no resemblance whatever to *P. pruinosus* Thomas, also procured at Fort Johnston, either in colour or in the character of the skull" (Elliot, *loc. cit.*, p. 195).

1907. *Papio furax* Elliot, Ann. Mag. Nat. Hist., (7) XX, December, p. 499. Two specimens. Type an adult male skin and skull from Baringo, northwest of Mt. Kenia, British East Africa. Allied to *P. doguera* of Abyssinia.

1909. *Papio tessellatum* Elliot, Ann. Mag. Nat. Hist., (8) IV, September, p. 247. Two specimens. Type an adult male skin and skull from Mulema, Ankole, Uganda.

1909. *Papio nigeriæ* Elliot, Ann. Mag. Nat. Hist., (8) IV, September, p. 247. Two specimens. Type an adult skin and skull from Ibi, northwestern Nigeria.

1911. *Papio porcarius griseipes* Pocock, Proc. Zool. Soc. London, Abstr. No. 93, March 28, p. 17; idem, September, p. 558. Potchefstroom, Transvaal, South Africa.

1913. *Papio anubis lestes* Heller, Smithsonian Misc. Coll., LXI, No. 19, November, p. 10. Three old males from Ulukenia Hills, Athi Plains, British East Africa.

1913. *Papio anubis vigilis* Heller, Smithsonian Misc. Coll., LXI, No. 19, November, p. 11. Two old males. "Type from the Lakiundu River near its junction with the Northern Guaso Nyiro, British East Africa."

1915. *Papio silvestris* Lorenz, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LII. June, p. 173. Type a young male from Mawambi, Ituri Forest, Belgian Congo.

1916. *Papio werneri* Wettstein, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LIII, p. 190. Gebel Talodi, near Talodi, Nuba Mts., southern Kordofan. Type, an adult female.

1917. *Papio graueri* Lorenz, Ann. Naturhist. Hofmus., Wien, XXXI, p. 236. Adult female from Rutshuru, south of Lake Albert Edward, Belgian Congo.

1918. *Choiropithecus rhodesiæ* Haagner, South Afr. Journ. Nat. Hist., I, May, p. 83. Central Rhodesia. Type, five year old specimen living in the National Zoölogical Gardens at Pretoria.

1919. *Papio kindæ* Lönnberg, Rev. Zool. Africaine, VII, October 1, p. 147. "Three adult females and several half-grown and young specimens from Kinda, district de la Lulua," Belgian Congo.

MANDRILLUS Ritgen

1824. *Mandrillus*[1] RITGEN, 'Nat. Eintheilung Säug.,' p. 33, and tabular insert = Les Mandrills = *Simia maimon* 1766 = *Simia sphinx* Linnæus 1758; *Simia mormon* Alströmer 1766 = *Simia maimon* Linnæus 1766. *Mandrillus* is here credited to Cuvier, who used only the French vernacular equivalent "Les Mandrills." The technical form *Mandrillus* is therefore Ritgen's.

1758. *Simia* LINNÆUS, 'Syst. Nat.,' 10th Ed., p. 25, part; also in part of many later authors.

Papio, part, of most recent authors.

1831. *Mandril* (subgenus of *Simia*) VOIGT, Cuvier's 'Thierreich,' I, p. 88. Includes two species: (1) *S.[imia]* (*M.*)[*andril*] *mormon* Linnæus, (2) *S.* (*M.*)*leucophæa* F. Cuvier. Thomas,[2] 1911, Proc. Zool. Soc. London, p. 126 = *Mandrillus* Ritgen, 1824.

1839. *Mormon* (subgenus of *Cynocephalus*) WAGNER, (1840), Schreber's 'Säugthiere,' Suppl., I, p. 164. Type, by tautonomy, *Simia mormon* Alströmer = *Simia sphinx* Linnæus, 1758. Preoccupied by *Mormon* Illiger, 1811, for a genus of birds.

1840. *Mormon* (subgenus of *Papio*) LESSON, 'Spec. Mamm.,' pp. 49, 111. For the mandrills = *Mormon* Wagner, 1839, but evidently independently proposed.

1843. "*Sphinx* Lesson" GRAY, in synonymy but not adopted by Gray. (Cf. Palmer, 1904, 'Index Gen. Mamm.,' p. 641, where the case is correctly stated.)

1862. *Drill* (subgenus of *Mormon*) REICHENBACH, 'Vollständ. Naturg. Affen,' p. 162. = *Mandrillus* Ritgen, 1824. Type, by monotypy, *Simia leucophæa* F. Cuvier.

1904. *Maimon* (subgenus of *Papio*) TROUESSART, 'Cat. Mamm. Viv. Foss.,' Suppl., p. 21. Type, by tautonomy, *Simia maimon* Linnæus. New name to replace *Mormon* Lesson, 1840. Not *Maimon* Wagner, 1839, for a wholly different group.

1913. *Mormon* (subgenus of *Papio*) ELLIOT, 'Rev. Primates,' II, (1912), p. 149. Includes *Simia sphinx* Linnæus, *Simia leucophæa* F. Cuvier, and *Papio planirostris* Elliot.

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Mandrillus*

1758. *Simia sphinx* LINNÆUS, 'Syst. Nat.,' I, p. 25. "Borneo" = West Africa. Based primarily on Gesner. (Cf. Elliot, 1909, Ann. Mag. Nat. Hist., (8) IV, November, p. 417; Thomas, 1911, Proc. Zool. Soc. London, p. 126.) F. Cuvier, however, in 1818, made the same determination, subsequently accepted by other systematists (Desmarest, 1820, Fischer, 1829, etc.). Cuvier stated: ". . . et le papio de Gesner ou le simia sphinx de Linneus, qui étoit un mandrill" (1818, Mém. Mus. Hist. Nat., Paris, IV, p. 424).

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[1] *Mandrill* Desmarest, 1820, 'Mamm.,' I, pp. 30, 70. Not a technical name.

Under the genus *Cynocephalus* Desmarest says (p. 30): "Ce genre se partage en deux sous-genres: 1°. les babouins proprement dits, et 2°. les mandrills." Again (p. 70): "II^{e}. sous-genre, Mandrill. Une queue très-courte et grêle, perpendiculaire à l'épine dorsale." The Mandrill group includes two species: (1) "*Cynocephalus mormon* = *Simia maimon* Linn. (jeune âge.)—*Simia mormon* Linn. (adulte)." (2) "*Cynocephalus leucophæus* = *Simia leucophæa* F. Cuv. Ann. du Mus. d'hist. nat. tom. 9, pl. 37.—*Drill*, ejusd. Mamm. lithogr. 1re livr." Desmarest adds in a footnote: "M. Fréd. Cuvier remarque, avec raison, que le papion de Gesner, le babouin de Brisson et le *simia sphinx* de Linnæus ne diffèrent pas du mandrill." This identification of *Simia sphinx* Linnæus long precedes the same determination made by Elliot in 1909 (Ann. Mag. Nat. Hist., (8) IV, December, p. 417) and later endorsed by Thomas (1911, Proc. Zool. Soc. London, March, p. 126).

[2] Thomas (*loc. cit.*, footnote), on the authority of Palmer, gives *Mandril* as "the technical name for the Mandrill, if considered generically distinct from other Baboons, as it apparently should be." He appears to have overlooked the fact, also shown by Palmer ('Index Gen. Mamm.,' p. 398), that *Mandrillus* has seven years priority over *Mandril* for the same group.

1766. *Simia maimon* LINNÆUS, 'Syst. Nat.,' I, p. 35. "Zeylona" = West Africa. Based on an immature example of *Simia sphinx* Linnæus.

1766. *Simia mormon* ALSTRÖMER, 'Acta Naem.,' p. 144. (Not seen.) Referred by later authors to *Simia sphinx* LINNÆUS.

1792. *Simia suilla* KERR, 'Anim. Kingd.,' p. 59, No. 10. = Pig-tail Baboon of Pennant and Edwards. "It [Pennant's figure] seems a bad representation of the Mandril, or Simia maimon" (Kerr, *loc. cit.*, No. 10).

1792. *S.*[*imia*] *Papio cinerea* KERR, 'Anim. Kingd.,' p. 62, No. 19. Based on the Cinereous Baboon of Pennant (1781, 'Hist. Quad.,' p. 176, No. 80), an immature example in the Leverian Museum. Not satisfactorily identifiable, but strongly suggestive of the later described *Simia leucophæa* of F. Cuvier. (Cf. Allen, 1895, Bull. Amer. Mus. Nat. Hist., VII, p. 185; ELLIOT, 1913, 'Rev. Primates,' II, (1912), p. 154).

1807. *Simia leucophæa* F. CUVIER, Ann. Mus. Hist. Nat. Paris, IX, pp. 477–482, Pl. XXXVII. ". . . probablement des côtes d'Afrique." Based on a young female purchased by a dealer in Bordeaux.

1840. *Mormon drill* LESSON, 'Spec. Mamm.,' p. 114. New name for *Simia leucophæa* F. Cuvier.

1906. *Papio mundamensis* HILZHEIMER, Zool. Anz., XXX, April, p. 109. Mukonje Farm, Mundame, Cameroon = *Simia leucophæa* F. Cuvier, *apud* Elliot who has examined the type, which is not fully adult.

1909. *Papio planirostris* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 305. Fan, southern Cameroon. Based on a skull without skin.

1917. *Mandrillus tessmanni* MATSCHIE AND ZUKOWSKY, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 470. Okak-land on the middle Benito, not far from Alen (Nkolentengan), Spanish Guinea. Type, adult male, skin and skull.

1917. *Mandrillus escherichi* MATSCHIE AND ZUKOWSKY, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 478. Ekododo on the Temboni, near southern border of Spanish Guinea. Type, adult male, skull without mandible.

1917. *Mandrillus zenkeri* MATSCHIE AND ZUKOWSKY, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 479. Probably between Bipindi on the Lokundje and Yaunde, Cameroon. Type, young male, skin and skull.

1917. *Mandrillus hagenbecki* MATSCHIE AND ZUKOWSKY, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 488. Probably coast region near Lagos, West Africa. Type, young adult male, skin and skull.

1917. [*Mandrillus zenkeri*] var. *ebolowæ* MATSCHIE AND ZUKOWSKY, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 493. Near Ebolowa, Cameroon. Type, skull.

COMOPITHECUS, new name

To replace *Hamadryas* Lesson, preoccupied by *Hamadryas* Hübner (1806) for a genus of insects. Genotype, *Simia hamadryas* Linnæus. In allusion to the heavy mantle of long hair in the males.

1840. *Hamadryas* LESSON, 'Spec. Mamm.,' p. 107. Type, by tautonomy, *Hamadryas chæropithecus* Lesson = *Simia hamadryas* Linnæus. Preoccupied.

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Comopithecus*

1757. *Simia ægyptiaca* LINNÆUS in Hasselquist, 'Iter. Palæst.,' p. 189. = *Simia hamadryas* Linnæus, 1758.

1758. *Simia hamadryas* Linnæus, 'Syst. Nat.,' I, p. 27. Based wholly on "Alp. ægypt. 248." "Africa" = Egypt.

1758. *Simia cynamolgos* Linnæus, 'Syst. Nat.,' I, p. 28. Based on *Simia ægyptiaca* Linnæus in Hasselquist (1757). Upper Egypt. = *Simia hamadryas* Linnæus.

1792. *Cercopithecus hamadryas ursinus* Kerr, 'Anim. Kingd.,' pp. 39, 63, No. 25. From Pennant, 1781, 'Hist. Quad.,' p. 179, No. 86.

1828. *Cynocephalus wagleri* Agassiz, Oken's Isis, XXI, p. 862, Pl. xi. Based on a female from an unknown locality. Compared with *Simia hamadryas* Linnæus.

1840. *Hamadryas charcpithecus* Lesson, 'Spec. Mamm.,' p. 109. "L'Abyssinie, l'Arabie et l'Égypte." New name for *Simia hamadryas* Linnæus.

1870. *Hamadryas ægyptiaca* Gray, 'Cat. Monkeys, Lemurs, and Fruit-eating Bats,' p. 34. New name for *Simia hamadryas* Linnæus and *Simia ægyptiaca* "Hasselquist."

1899. *Papio arabicus* Thomas, Proc. Zool. Soc. London, p. 929 (preliminary notice); idem, 1900, p. 96 (full description). Subaihi Country, "about 60 miles northwest of Aden," Arabia. Type a young female. Similar to *Simia hamadryas* Linnæus in coloration but considerably smaller.

1909. *Papio brockmani* Elliot, Ann. Mag. Nat. Hist., (8) IV, September, p. 248. Type an adult male from Dirre Dawa, Somaliland.

Theropithecus I. Geoffroy

1843. *Theropithecus* I. Geoffroy, Arch. Mus. Hist. Nat., Paris, II, (1841), p. 576; 1851, 'Cat. Méth. Mamm. Mus. Hist. Nat. Paris,' p. 32. "Genre établi par nous, *Mémoire sur les Singes*, 1843 (dans les *Archiv. du Mus.*), pour le *Gelada* des Abyssins." Type, by monotypy, *Macacus gelada* Rüppell.

1843. *Gelada* Gray, 'List Spec. Mamm. in Brit. Mus.,' pp. xvii, 9. Type, by monotypy and by tautonomy, *Gelada rüppellii* Gray = *Macacus gelada* Rüppell. *Gelada* and *Theropithecus* are of nearly even date but the latter has been assumed by authors to have priority. (Cf. Palmer, 1904, 'Index Gen. Mamm.,' p. 673.)

Specific Names Referable to *Theropithecus*

1835. *Macacus gelada* Rüppell, 'Neue Wirbelth.,' Säug., p. 5, Pl. ii. Mountains of Southern Abyssinia.

1857. *Theropithecus senex* Pucheran (*ex* Schimper MS.), Rev. Mag. Zool., (2) IX, p. 243. Type a mounted specimen (the skull inside the skin) in the Paris Museum, from the type locality of *Macacus gelada* Rüppell. (Cf. Elliot, 1913, 'Rev. Primates,' II, (1912), p. 156.)

1862. *Theropithecus nedjo* Reichenbach, 'Vollständ. Naturg. Affen,' p. 204. (Not seen.) New name for *Theropithecus obscurus* Heuglin.

1863. *Theropithecus obscurus* Heuglin, Nov. Act. Ac. Leop. Carol. Nat. Cur., XXX, Abhandl. 2, pp. 10–14. Sources of the Takazza River, Galla Country, southern Abyssinia, altitude 6000–10,000 feet.

1870. *Gelada rüppellii* Gray, 'Cat. Monkeys, Lemurs, and Fruit-eating Bats,' p. 33. New name for *Macacus gelada* Rüppell.

The *Papio cynocephalus* Group

Some twenty names have been given to supposed species or subspecies of the *Papio cynocephalus* group, all but three of which were rated by their respective authors as species. The three earliest names (*cynocephalus, anubis, thoth*) were based on menagerie specimens from unknown localities. Most of those published since 1850 (beginning with *doguera* Pucheran, 1856) have been based on field specimens, with at least approximate (mostly with definite) localities but they rest on scanty (frequently immature) material. The first series from any single locality that became available for study consisted of eight specimens of *Papio tessellatum* Elliot from Rutshuru, representing adults and young of both sexes, discussed in detail by Lönnberg in 1917 (Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, pp. 40–45, Pl. vii).

Elliot, in his 'Review of the Primates' (II, pp. 124–143) recognized twelve forms of this group, all of them as full species. Seven other forms have since been added. The type localities extend in East Africa from the Anglo-Egyptian Sudan and Abyssinia south to the southern end of Lake Nyasa and westward into eastern Belgian Congo, with one as far west as Nigeria and another in eastern Cameroon.

While the number of distinct specific forms enumerated above is at present beyond reasonable conjecture, it is certain that a considerable number will prove to be synonyms, and equally certain that many of them will ultimately stand as designations for regional forms. The series of fifteen specimens collected in a comparatively small area by the American Museum Congo Expedition demonstrates that baboons are no exception to the rule of a wide range of differentiation due to age, sex, and individual variation, especially in respect to details of skull and teeth, and indicate that certain cranial characters usually considered as of great diagnostic importance may have no distinctive value whatever.

The great difficulty in determining the present series of Congo baboons is the uncertain basis of the original *Simia cynocephalus* Linnæus. While practically all recent systematists concede that it must have been the large "yellow" baboon of East Africa, no one except Anderson (1902, 'Zool. Egypt,' Mamm.), seems to have made a serious attempt to establish for it a definite type region. Nor does it seem possible to do this except more or less arbitrarily. Hence there is no absolutely definable *Papio cynocephalus typicus* with a definite habitation, since the first knowledge of it was derived from specimens from unknown parts of Africa. E. Geoffroy in 1812 (Ann. Mus. Hist. Nat., Paris, XIX, p. 102) indicated for it: "Habite l'Afrique méditerranéenne." In 1829

J. B. Fischer ('Synop. Mamm.,' p. 33) gave "Hab. in Africa boreali," citing F. Cuvier as authority. Anderson (*loc. cit.*, p. 64), after a thorough discussion of the literature of the subject and a personal study of all the extant specimens of East African baboons in the British, the Berlin, the Paris and other museums of Europe, reached the conclusion that the type region of *cynocephalus* Linnæus was inland from Mombasa. This decision I think may well be accepted as final. He also concluded that *Cynocephalus babouin* Desmarest and *Cynocephalus thoth* Ogilby, after an examination of the specimens on which they were based, should be considered as unquestionably synonyms of it (*loc. cit.*, pp. 57–64).[1]

The "Cynocéphale Anubis" of F. Cuvier (*Simia anubis* Fischer) was also considered at length by Anderson (*loc. cit.*, pp. 34–53), who assumed on wholly conjectural grounds that the type probably came from the Upper Nile Valley (*loc. cit.*, p. 36). The type of *S. anubis* was a young animal in the Paris menagerie from an unknown part of Africa, and was not preserved. The description and figure are so equivocal that the species has been assigned both to West Africa and to East Africa by subsequent authors.[2] Under these conditions it is absolutely undeterminable, and Anderson did poor service to the nomenclature of the baboons by recognizing it as entitled to serious consideration. He even admitted that "Unfortunately after all these years the material at present available is not sufficient for the settlement of this question" (*loc. cit.*, p. 37), yet he accepted the name *anubis* for all the baboons of this group occurring from the Upper Nile eastward to the Red Sea, synonymizing with it *Papio doguera* (Pucheran) of Abyssinia and *Papio heuglini* Matschie from the Atbara River to the White Nile.[3] Anderson defines the range of *P. anubis* (*loc. cit.*, pp. 37, 38) as follows: "The southern range of baboons conforming to *P. anubis* is practically unknown, but they appear to spread from Abyssinia and the Nile Valley as far as the region of the great Lake Victoria Nyanza. They also extend through the river system of the Bhar-el-Ghazal to Dar Fertit, where Schweinfurth obtained specimens. From the Victoria Nyanza district this species possibly follows the greater part of the river-system of the Congo, while from Dar Fertit it extends to the Niger. Its form seems to be modified in given areas of this vast region, but the differences manifested in the scanty material at present available will probably be somewhat bridged over when zoologists are placed in full possession of the different phases assumed by the individuals in diverse geographical areas at various periods of their existence." This forecast of the range of the group has in the twenty years since it was made been amply confirmed by acquisitions of material from the regions in question, but the status and the relationships of the various forms based on the later material is still a problem for the future. It is unfortunate, however, that Anderson should have selected for the group an absolutely untenable name, which has for the most part escaped acceptance by later authors.[1] The half-dozen forms described from specimens obtained within the area assigned to *anubis* since the publication of Anderson's work have for the most part been given the rank of species, while Elliot recognized *doguera*, *heuglini* and *neumanni* as full species.

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[1] Matschie in 1898 (Sitzungsb. Ges. Naturf. Fr. Berlin, p. 79) considered the baboon of the coast region of German East Africa to be in all probability the *Papio thoth* of Ogilby.

[2] Ogilby in 1838 ('The Menageries,' I, pp. 425–427) believed *Cynocephalus anubis* to be a "Nubian species." In 1843 (Proc. Zool. Soc. London, p. 9) he retracted this opinion and assigned it to West Africa.

[3] Anderson (*loc. cit.*, p. 40 and passim) has fixed the type locality of *Papio heuglini* Matschie as Shilluk Island, White Nile, and figured (*loc. cit.*, Pl. v) what he considers should be the type skull. Matschie had three specimens from two different localities all collected by Heuglin, an old male and a young female, "am Weissen Nil in der Nähe der Schilluk-Inseln," and a young male "im Sennaar," and did not designate a type, but gave the range of the species as the Bahr el Abiad, Bahr el Azrek and the Atbara River.

There being very little material in the museums of this country bearing on the questions at issue in this connection no wholly satisfactory conclusions can be reached regarding the nomenclature and relationships of the baboons of the Congo area, but it seems admissible to consider the baboons of British and German East Africa as referable to the *Papio cynocephalus* group in contradistinction from the larger and darker forms of Abyssinia, the Upper Nile and Upper Congo regions. The forms from these districts are evidently closely related, probably conspecific, as are the members of the *Colobus abyssinicus* group occurring in these areas. Anderson's colored plate (*loc. cit.*, Pl. IV) of the type of *Papio doguera* and his plate of the skull of the same species (*loc. cit.*, Pl. VII) are strikingly like specimens from the Upper Congo and permit little doubt of their conspecific relationship. Consequently it seems reasonable to accept, provisionally at least, this name in a specific sense for the present series from the Upper Congo district, and as the earliest applicable specific name for the two well-marked regional forms this material represents.

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[1] In a bracketed paragraph at the end of Anderson's article on *Papio anubis* W. E. De Winton gives his views on the status and relationships of the forms of the *anubis* group. In his opinion *P. doguera* and *P. heuglini* are synonyms of *anubis*, and specimens from "the neighbourhood of Victoria Nyanza and Lake Rudolf [are referable] to a slightly modified form, *P. anubis* subsp. *neumanni;* while a large form with strongly developed teeth, ranging from Nigeria to Dar Fertit, may be known as *P. anubis* subsp. *olivaceus*." The last name is certainly untenable if based on the *Cynocephalus olivaceus* of I. Geoffroy, as the type locality is given by Geoffroy, as "De Guinée, golfe de Bénin," and was based on a young specimen that lived for a time in the Paris menagerie, and the status of the species was admitted by the author as quite uncertain. If *olivaceus* is used in a new sense it is of course preoccupied for a supposed form of *Papio* from the coast of Guinea. Elliot (1913, 'Rev. Primates,' II, (1912), p. 132) examined the type of Geoffroy's *Cynocephalus olivaceus* and says of it: "This animal is a female and not full grown. It has the reddish coloring so characteristic of *P. papio*, and nothing of an olivaceous hue to warrant the name given by Geoffroy."

Papio doguera tessellatus Elliot

Plate LXXXIII, Figure 1

Papio tessellatum [sic] Elliot, 1909, Ann. Mag. Nat. Hist., (8) IV, September, p. 247 ; 1913, 'Rev. Primates,' II, (1912), p. 127. Type, adult male, Mulema, Ankole, Uganda; another young specimen from Rogoro.

Papio tessellatus Lönnberg, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, pp. 40–45, Pl. vii (skulls). Rutshuru, between Lake Albert Edward and Lake Kivu, eight specimens; 1919, Rev. Zool. Africaine, VII, p. 145. Rutshuru (1 specimen), Masisi (4), Mawambi (1), Makala (2), Avakubi (1), Belgian Congo.

Papio silvestris Lorenz, 1915, Anz. Ak. Wiss. Wien, Math.-Naturwiss. Kl., LII, June, p. 173. Type (and only specimen), Mawambi, Belgian Congo.

Papio graueri Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 236. Based on adult female from Rutshuru.

Represented by seven specimens, collected as follows:

Akenge, 4 (adult ♂, adult ♀, and two immature ♂), September 14–October 29, 1913.

Niapu, 2 (adult ♂ and ♀), November 20 and December 5, 1913.

Avakubi, 1 (subadult ♀), October 25, 1909.

The specimens are skins with skulls and field measurements. One is represented by a complete skeleton.

The external measurements of five specimens of *Papio doguera tessellatus*, taken from animals in the flesh, are as follows:

Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
52680	♂	Niapu	1320	780	540	230	67
51380	♂	Akenge	1335	750	585	234	64
52668	♀	"	1015	562	453	185	61[1]
52679	♀	Niapu	1050	635	415	185	65
52671	♀ juv.	Avakubi	1030	550	480	200	..

The cranial measurements of the same five specimens of *Papio doguera tessellatus* are as follows:

Cat. No.	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
52680	237	189	192	140
51380	230	185	193	130
52668	178	140	150	106
52679	...	...	...	106
52671	167	130	139	100

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[1] Last molars enclosed in the alveoli.

Cat. No.	Orbital Breadth	Interorb. Breadth	Postorb. Constr.	Mastoid Breadth
52680	103	13.7	62.0	104.5
51380	100	14.5	63.2	101.6
52668	75	7.5	58.5	84.5
52679	...	8.7	55.3	....
52671	...	9.1	61.3	79.0

Cat. No.	Upper Cheekteeth	Upper Molars	m^3	Basal Suture
52680	63.3	44.5	16.0	Closed
51380	58.3	40.7	14.8	Open
52668	53.3	38.7	13.4	Closed
52679	55.2	39.0	12.5	Closed
52671	....	....	....	Open. Last molars still enclosed in alveoli

As stated above, the series of baboons collected by the American Museum Congo Expedition represent two regional phases. Of the fifteen specimens obtained seven were collected in the rain forest region and eight in the adjoining bush-veldt country. The differences are mainly in coloration, and are obvious at a glance, the forest specimens being much darker and far more intensely colored. The individual variation in coloration, noteworthy in both, is parallel in character in the two series, and is compared below in detail under the veldt form.

Immature Pelage.—The first pelage is represented by a young male (No. 52669) from Akenge (Pl. LXXXIII, fig. 1) in which the posterior tooth of the milk dentition is still enclosed in the jaw. The pelage of the body, hind limbs and tail is soft and short, much thinner on the ventral surface than elsewhere, the skin here showing through the slight covering of hair. The color is seal-brown, the hairs minutely tipped with grayish shading to olivaceous. The average length of the coat on the back is about 14 mm. The top of the head is covered with much longer, more silky, lustrous black hair, ranging in length from about 22 to 25 mm. On the outside of the fore limbs, from the shoulders to the tips of the toes, the first coat has been largely replaced by the coarse, stiff hairs of the second coat, in character and color much like that of adults, being a coarse grizzle of black and pale yellow.

Adult Pelage.—The general effect of the coloration of an average adult male could scarcely be better represented than in the colored plate of Anderson's "*Papio anubis*" (1902, 'Zool. Egypt,' Mamm., Pl. iv), subtitled "*P. doguera*, Pucheran." The general tone is rather too dark, particularly as regards the hind feet, the fore limbs and flanks; in other respects, as the depth and distribution of the color tones, it is a fair representation of the forest baboon of the Upper Congo. Anderson's description of the color characters (*loc. cit.*, p. 34) is equally applicable to the northeastern Belgian Congo form, even to details. The "checkered appearance" of the coat given by Elliot as a distinctive feature of his *Papio tessellatum* [sic] is strongly developed in several specimens of the present series, while his general description of the Mulema type of the species would need scarcely any qualification to make it apply to the Niapu and Akenge specimens, in which the checkered effect of black blotches on the ochraceous-buff ground color is strongly marked on the posterior half of the dorsal area, but less distinct on the shoulders and foreback, where the tips of the hairs in some of the specimens are frayed by wear.

The pelage is long and thick. The hairs individually of the upperparts are purplish black for about the proximal half; the mid-portion is ochraceous-buff on the lower back and hind limbs, and light ochraceous-buff on the anterior dorsal area and fore-limbs, followed by an apical broad band of deep black. The top of the head is darkened by the lengthening of the black hair tips, giving in some instances the effect of a fairly well-defined black crown-patch. There is an indistinct whitish superciliary band, and the cheeks are grayish. The upper surface of the hands varies in different specimens from a strong grizzle of black to wholly black, including the wrist; feet usually only slightly grizzled with black but in some instances they are nearly as dark as the hands. The tail is pale ochraceous-buff grizzled with black, the individual hairs being banded like those of the body.

INDIVIDUAL COLOR VARIATION.—There is considerable variation in the coloration of different individuals, especially in the amount of black on the crown, hands and feet, and in the distinctness of the dark blotches on the body, the latter obviously depending to some extent on the condition of the pelage in respect to wear.

INDIVIDUAL VARIATION IN SIZE AND IN CRANIAL CHARACTERS.—Individual variation in size is strongly marked, especially shown in the skull. The adult specimens of this series are all of about the same age, as indicated by the condition of the skull and teeth; in none are the teeth appreciably worn. As shown in the above table of measurements of skulls, No. 51380, an adult male from Akenge differs greatly from No. 52680, an adult male from Niapu. The latter is probably a few months older than the former, as indicated by the canines and the texture of the zygoma, the surface of the orbits, and of the external edges of the sagittal and lambdoid crests, where the bone is less dense in the Akenge specimen than in the one from Niapu. In general dimensions the two skulls do not essentially differ, the Akenge skull being only slightly smaller in some of the axial measurements and slightly larger in some of the transverse measurements. The striking differences are the extreme narrowness of the preorbital portion of the Akenge skull and the correlated reduction of the dental armature and the exceptional robustness of these parts in the Niapu skull. While the rostrum is 8 mm. longer in the Niapu skull than in the other, the nasals are 4.5 mm. shorter. The following measurements indicate the principal differences in the proportions of the rostrum: length from the mesial point of the orbital crest to the anterior border of the premaxillaries in the two skulls, Akenge 139 mm., Niapu 147; middle of anterior edge of orbit to anterior border of intermaxillaries, Akenge 115.6, Niapu 118.3; breadth of rostrum at base of canines, A. 53.5, N. 58.7; breadth at base of outer incisors, A. 36.4, N. 42.0; greatest breadth at malar suture, A. 53.0, N. 55.5; depth at m^2, A. 46.0, N. 48.6. Palatal length (front border of premaxillaries to posterior border of palate), A. 115.3, N. 117.3; breadth of palate at p^2, A. 34.0, N. 32.8; breadth at m^3, A. 31.7, N. 29.8. Length of upper toothrow (c-m^3 inclusive), A. 73.5, N. 80.2; cheek-teeth, A. 58.3, N. 63.3; upper molars, A. 40.7, N. 44.5; length of m^3, A. 14.8, N. 16.0. Canines, length from alveolar plane, A. 38.0, N. 43.4; antero-posterior breadth at alveolar plane, A. 17.2, N. 18.9; transverse breadth at same point, A. 10.0, N. 13.6.

The dominating difference between the two skulls is the exceptional development of the dental armature in the Niapu specimen and the unusual narrowness of the rostrum in the Akenge skull. The difference in the size of the teeth also renders the palate narrower in the Niapu skull, while the breadth of the rostrum is greater, a differentiation more striking when the skulls are placed side by side than the above statistics would seem to indicate.

Niapu and Akenge are both in the same environment and separated by less than fifty miles in a direct line. The two skulls above described are both extremes, but in opposite directions, and the differences are due beyond question to individual variation. A somewhat similar case occurs in two adult female skulls from Bafuka, as noted below.

Papio doguera heuglini Matschie

Plate LXXXII

Papio heuglini Matschie, 1898, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 81. Based on an adult male and an immature female collected by Heuglin near the

Shilluk Islands, White Nile. No type designated. Later the male was designated as type by Anderson.

Papio anubis ANDERSON, 1902, 'Zool. Egypt,' Mamm., pp. 34–53, Pls. IV–VIII, part; Upper Nile specimens only.

Papio anubis subsp. *olivaceus* DE WINTON, 1902, Anderson's 'Zool. Egypt,' Mamm., p 53, part. Not *Cynocephalus olivaceus* I. Geoffroy = *Papio papio.*

? *Papio nigeriæ* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 247; 1913, 'Rev. Primates,' II, p. 125, Pls. VI and VII (skull). Type, an adult, Ibi, North Nigeria.

Papio nigeriæ LÖNNBERG, 1919, Rev. Zool. Africaine, VII, p. 146. An adult male and a young female, Bafuka, Uele, Belgian Congo.

Represented by 8 specimens (5 adult, 3 young) collected as follows:

Bafuka, 5 (adult ♂, 2 adult and 2 young ♀), March 19–April 1, 1913.

Aba, 1 (young ♂), July 17, 1911.

Faradje, 2 (old ♂), November 23–30, 1911.

The specimens are skins with skulls and field measurements. Two of them, adults, are represented by complete skeletons.

The external measurements of five adults of *Papio doguera heuglini*, taken from animals in the flesh, are as follows:

Cat. No.	Sex	Locality	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
52676	♂	Bafuka	1270	735	535	225	63
52677	♂	Faradje	1385	785	600	225	72
52678	♂	"	1270	750	520	230	74
52672	♀	Bafuka	1190	660	530	220	68
52674	♀	"	1040	590	450	190	60

The cranial measurements of the same five specimens of *Papio doguera heuglini* are as follows:

Cat. No.	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
52676	207	163	162	123
52677	230	187	192	129
52678	233	182	190	139
52672	181	140	145	113
52674	162	120	136	105

Cat. No.	Orbital Breadth	Interorb. Breadth	Postorb. Constr.	Mastoid Breadth
52676	92	12.7	62.4	86.5
52677	100	12.8	62.7	101.4
52678	103	14.5	58.2	100.7
52672	83	10.5	61.3	88.5
52674	73	7.2	54.2	78.8

Cat. No.	Upper Cheekteeth	Upper Molars	m^3	Basal Suture
52676	62.0	44.4	16.1	Open
52677	59.3	41.0	13.9	"
52678	55.6	38.9	13.4	Closed
52672	49.6	36.1	12.6	"
52674	51.7	36.6	12.5	Open

Immature Pelage.—Two specimens from Bafuka, in which the deciduous dentition is fully developed, show no trace of the natal coat, the pelage being long and coarse, that of the back having a length of 40 to 45 mm., increasing on the nape to 50 to 60 mm. The basal third to one-half is dark grayish brown, followed by a narrower zone of pale yellow and long black tips, giving a general surface effect of pale yellow buff conspicuously grizzled with black. They differ from adults in having more yellow and less black in the coloration.

Adult Coloration.—The present series from the bush-veldt adjoining and to the north of the Rain Forest is similar in size and coloration to the series referred above (p. 317) to *P. d. tessellatus* except in being uniformly much paler, in this respect the two series differing strongly. The ground color of the posterior half of the upperparts, including the hind limbs, is about warm buff of Ridgway, of the rest of the upperparts pale warm buff, in contrast with the ochraceous buff and pale ochraceous buff of the *tessellatus* series. The upper surface of the hands varies, as in the latter, from a strong mixture of black to entirely black, the hind feet varying from a strong grizzle of black to nearly uniform grayish brown. The basal half of the pelage is dark drab-gray instead of purplish black, the yellowish middle zone pale buff instead of ochraceous buff, and the black tip is shorter. There is a tendency to the same black coronal patch, strongly developed in some and absent in others, and to a checkered effect in the color pattern.

Size of the Two Forms of *Papio*.—The two forms differ only slightly in size, with indications, especially in external measurements, toward a slightly larger size for the veldt form. The present material is too scanty to be decisive, but points to an agreement in this respect with the subspecies of *Colobus* having the same distribution, the veldt form being distinctly larger than the forest form. The skulls (four adults of each series) show no greater variation in size or other characters than might be found in an equal number from a single locality.

Individual Variation in Size and in Cranial Characters.—Two adult female skulls show an exceptional difference in size. Both are of practically the same age, and both were taken the same day at the same locality from the same band. Hence the unusual difference in size, both external and cranial, must be regarded as due to individual differentiation in members of the same troop. As shown in the above table of measurements (p. 321), the smaller of the two (No. 52674) is 10 to 12 per cent less in the principal measurements of the skull than the larger one (No. 52672), while the dental measurements are practically the same. The larger skull agrees closely in size with a female skull of strictly comparable age from Akenge, and may be considered as representing normal size, and the smaller one as an exceptionally small or dwarfed individual. If, however, the two specimens had been taken at different times and fallen into the hands of different investigators they might each have been taken as the type of a new form, as most certainly would have been the case with the two male skulls of *tessellatus* described above from respectively Akenge and Niapu.

While the number of fully adult males and females is small, they exceed the number hitherto reported from any other area of similar extent within the range of the *Papio doguera* group. This series also affords the only available external measurements taken from animals in the flesh, all others having been based on skins or on mounted specimens and are consequently of little value.

The two Congo forms are apparently indistinguishable by either external or cranial dimensions. The published external measurements of the mounted type of *doguera* exceed all others, but are probably from an overstuffed specimen,[1] as the cranial measurements do not indicate so large an animal.

The four adult male skulls from the Upper Congo vary in the greatest length measurement from 230 to 237 mm., the average being 233. They are thus the largest baboon skulls thus far recorded. Anderson gives (see below, table on p. 324) the greatest length of two male skulls of *doguera* from Abyssinia as, respectively, 228 and 209 mm.; of two male skulls of *heuglini* from, respectively, the White Nile (Shilluk Islands) and the Gash River as 218 and 213 mm. His figures of these skulls (Pls. v–vii) show they were old adults, and thus strictly comparable in age with the Upper Congo specimens, although much smaller. Lönnberg gives the greatest length measurement of an adult male skull of *tessellatus* from Rutshuru as 216 mm. His plate indicates that the skull is not that

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[1] Pucheran gave the measurements of the type of *doguera* as head and body 933 mm., tail to end of hair 568, making a total length of 1501. Anderson's, of the same specimen, are, respectively, 950 and 560, making a total length of 1510. Elliot gives the total length as 1678.4, and the length of the tail as 609.6. Anderson gives the measurements of the type (male) of *heuglini* as, head and body 875, tail 470, or a total length of 1345. Elliot gives for the type (male) of his *tessellatus* (from a skin), total length 1400 mm., tail to end of hair 500, hind foot 210, dimensions quite in agreement with those of specimens from the Upper Congo.

Cranial Measurements of *Papio doguera* Group

(Compiled from Elliot, Lönnberg, and Anderson)

Name	Locality	Sex	Greatest Length	Occipito-nasal Length	Basal Length (Hensel)	Zygomatic Breadth	Postorb. Constr.	Upper Cheek-teeth
nigeriæ[1]	Ibi, N. Nigeria	♂	220	181	153	133	60.9	53.9
tessellatus[1]	Mulema, Ankole	♂	...	170	158	131	60.9	58.3
tessellatus[2]	Rutshuru	♂	216	175	155	129	58.0	53.0
yokoensis[1]	Central Cameroon	♂	215	...	152	...	60.0	57.0
heuglini[1]	Bahr el Ghazal	♂	214	178	153	128	60.8	57.8
heuglini[3]	Shilluk I., White Nile	♂	218	...	162	127	....	....
heuglini[3]	Near Kassala, Gash River	♂	213	...	148	126	....	....
doguera[3]	Abyssinia	♂	228	...	165	128	....	....
doguera[3]	Abyssinia	♂	209	...	147	126	....	....

[1] Authority of Elliot, 1913, 'Rev. Primates,' II, (1912).

[2] Authority of Lönnberg, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, p. 41.

[3] Authority of Anderson, 1902, 'Zool. Egypt,' Mamm., p. 40.

Cranial Measurements of *Papio anubis* Anderson = *P. doguera* (Pucheran)

(From 'Zool. Egypt,' Mamm., p. 40)

Anderson's No.	Locality	Sex	Greatest Length	Basal Length	Zygomatic Breadth	Upper Molars	Remarks
1	Abyssinia (Rüppell)	♂	228	165	128	40.0	"Rüppell, No. 4, labelled *C. anubis*"
4	Abyssinia (Schimper)	♂	209	147	126	38.5	Figured by Anderson, *loc. cit.*, Pl. VII, as *P. doguera* (Pucheran).
2	Shilluk Islands, White Nile	♂	218	162	127	38.7	"Type" of *Papio heuglini* Matschie. Figured by Anderson, *loc. cit.* Pl. V.
3	Gash River, near Kassala (= Upper Atbara R.)	♂	213	148	126	41.2	Figured by Anderson, *loc. cit.*, Pl. VI, as "*Papio anubis*."
5	Gash River, near Kassala (= Upper Atbara R.)	♀	177	126	105	36.5	
6	Gash River, near Kassala (= Upper Atbara R.)	♀	174	122	99	38.9	
8	Abyssinia (Rüppell)	♀	170	118	103	36.0	"Rüppell, No. 5, labelled *C. anubis*."
	Average	**4 ♂**	**217**	**156**	**127**	**39.6**	
	"	**3 ♀**	**174**	**122**	**102**	**37.1**	

Cranial Measurements of *Papio cynocephalus*

(From Anderson, 'Zool. Egypt,' Mamm., pp. 74, 75)

Anderson's No.	Page	Locality	Sex	Greatest Length	Basal Length	Zygomatic Breadth	Upper Molars	Remarks
1	74	Zomba, Nyasa	♂	204	140	118	34.0	"Adult."
3	74	Fort Johnston, Nyasa	♂	198	143	116	32.8	"
7	74	Langenberg, North Nyasa	♂	192	137	99	33.8	"
2	74	Lamu	♂	202	151	114	37.0	"Adult." "Type of *Papio thoth ibeanus* Thomas." Figured by Anderson, *loc. cit.*, Pl. XII.
3	75	Ukami	♂	201	140	113	....	"Adult." "One of the types of *P. langheldi* Matschie."
1	75	Moschi, Kilimanjaro	♂	212	158	114	37.8	"Adult."
2	75	Osi Tana	♂	210	158	118	36.8	"
4	75	Near Madschame, Kilimanjaro	♂	199	150	110	36.3	Age not indicated.
4	74	Mpapwe	♂	196	149	...	34.0	"Not fully adult."
5	74	Mpapwe	♂	196	149	109	37.7	"Not fully adult."
8	74	Mpapwe	♂	191	141	...	37.5	"Not fully adult."
6	74	Perondo, Uhehe	♂	192	140	109	35.0	"Not fully adult." Figured by Anderson, *loc. cit.*, Pl. XIII, as *P. langheldi* (Matschie).
9	74	Mombasa	♂	188	134	101	34.5	"Not fully adult." "Zool. Gardens, Lond."
10	74	Mombasa	♀	159	109	94	....	"Not fully adult." "Zool. Gardens, Lond."
5	75	Marpiensen, near Tanga	♀	152	104	91	32.5	Age not indicated.
Average			**7 ad. ♂**	**203**	**147**	**113**	**35.4**	
"			**2 ♀**	**155**	**107**	**93**		

of an old adult, and would have become larger with increase in age. The greatest length of the type skull (an old male) of *P. nigeriæ* is not given by Elliot, but as computed from his figures ($\frac{3}{4}$ nat. size, Pls. VI, VII) is 220 mm. While this is less than the same measurement in the Upper Congo specimens, most of the other dimensions, as recorded by Elliot, agree closely with those of the Congo series.

SEXUAL VARIATION.—The sexual difference in size in baboons is well known to be strongly marked. In the present group the females are fully one-fourth smaller than the males, on the basis of linear dimensions.

In addition to the cranial measurements tabulated above (pp. 317, 318, 321, 322,) all available published measurements of skulls of the *Papio doguera* group (pp. 324–325) are added for convenient comparison. The cranial measurements given by Anderson for the forms of the *Papio cynocephalus* group are given too, showing their much smaller size (p. 326).

CERCOCEBUS E. Geoffroy

1812. *Cercocebus* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, XIX, p. 97. Eight species, of which three are African and five are Asiatic. Type, by subsequent designation (Elliot, 1913, 'Rev. Primates,' II, (1912), p. 254), *Cercocebus fuliginosus* E. Geoffroy.

1841. *Æthiops* (subgenus of *Cercopithecus*) MARTIN, 'Gen. Introd. Nat. Hist. Mamm. Anim.,' p. 508. Proposed for the "White-eyelid Monkey," without designation of the species. Type, by tautonomy, *Simia æthiops* auct., not Linnæus.

1870. *Semnocebus* (subgenus of *Cercocebus*) GRAY, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' p. 27. Type, by monotypy, *Presbytis albigena* Gray. Not *Semnocebus* Lesson, 1840.

1903. *Lophocebus* PALMER, Science, (new ser.) XVII, May 29, p. 873. To replace *Semnocebus* Gray, preoccupied.

1904. *Leptocebus* TROUESSART, 'Cat. Mamm.,' Suppl., p. 15. To replace *Semnocebus* Gray, preoccupied = *Lophocebus* Palmer dated one year earlier.

1914. *Cercolophocebus* (subgenus of *Cercocebus*) MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 341. Type, by original designation, *Cercocebus aterrimus* (Oudemans). Also employed (*loc. cit.*, p. 342) as a full genus.

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Cercocebus*

1775. *Simia æthiops* (not Linnæus) SCHREBER, 'Säugthiere,' I, p. 105, Pl. XX. Based on "Le Mangabey" of Buffon.

1792. *S.[imia] Cercopithecus æthiops torquatus* KERR, 'Anim. Kingd.,' p. 67, No. 39. = Mangabey à collier blanc, Buffon, 1766, 'Hist. Nat.,' XIV, p. 256, Pl. XXXIII. First available name; for specimens from Sierra Leone and Liberia.

1797. *Simia atys* AUDEBERT, 'Hist. Nat. Singes et Makis,' Family IV, Sect. 2, p. 13, Pl. VIII. "Indes Orientales" = West Africa. Unidentifiable; based on an albino from an unknown locality. Still preserved in the Paris Museum. (Cf. Elliot, 1913, 'Rev. Primates,' II, (1912), p. 262.)

1812. *Cercocebus fuliginosus* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, XIX, p. 97. = Le Mangabey, Buffon, 1766, 'Hist. Nat.,' XIV, Pl. XXXII. Locality unknown. Wrongly identified by Buffon with *Simia æthiops* Linnæus, "Syst. nat. edit. x, p. 28."[1] = *S. Cercopithecus æthiops torquatus* Kerr.

1821. ———*æthiopicus* F. CUVIER, 'Hist. Nat. Mamm.,' II, livr. XXXV. = *S.*[*imia*] *Cercopithecus æthiops torquatus* Kerr. Cuvier attributes the name to E. Geoffroy but gives no reference. The context indicates that *æthiopicus* F. Cuvier is a miscitation of *Cercocebus æthiops* E. Geoffroy (1812, Ann. Mus. Hist. Nat., Paris, XIX, p. 97). F. Cuvier does not give any generic name with his *æthiopicus*.

1843. *Cercocebus collaris* GRAY, 'List. Mamm. Brit. Mus.,' p. 7; 1870, 'Cat. Lemurs, Monkeys, and Fruit-eating Bats,' p. 27. Primarily the "Mangabey à collier blanc" of Buffon (1766, 'Hist. Nat.,' XIV, p. 256, Pl. XXXIII). Hence = *S.*[*imia*] *Cercopithecus æthiops torquatus* Kerr.

1850. *Presbytis albigena* GRAY, Proc. Zool. Soc. London, p. 77, Pl. XVI (animal). Based on an immature menagerie specimen from an unknown locality.

1853. *Cercopithecus lunulatus* TEMMINCK, 'Esquiss. Zool.,' p. 37. "Patrie. Habite les fôrets qui bordent la rivière Boutry, côte de Guiné." No type designated. First mangabey described from a definite locality.

1879. *Cercocebus galeritus* PETERS, Monatsb. Ak. Wiss. Berlin, p. 830, Pls. I*B* (animal) and III (skull). Mitole, mouth of Osi and Tana Rivers, British East Africa.

1886. *Cercocebus agilis* R. RIVIÈRE, Rev. Scient., (3) XII, p. 15. Brief mention of the type specimen from "Congo français." Name credited to A. Milne-Edwards, but apparently here first published.

1890. *Cercopithecus aterrimus* OUDEMANS, Zool. Garten, XXXI, p. 267. Stanley Falls, right bank of the Congo. Type a half grown specimen that died in the Hague Zoölogical Gardens.

1899. *Cercocebus congicus* SCLATER, Proc. Zool. Soc. London, pp. 827–828, fig. "Terra Congica," without definite locality. "Based on a single female specimen living in the Antwerp Gardens and believed to have come from the district of Stanley Falls on the Upper Congo" (Pocock).

1900. *Cercocebus chrysogaster* LYDEKKER, Novit. Zool., Tring, VII, p. 279, Pl. III (animal). "Upper Congo," exact locality unknown. Type an immature specimen in the London Zoölogical Gardens.

1900. *Cercocebus hagenbecki* LYDEKKER, Novit. Zool., Tring, VII, December, p. 594; 1901, VIII, Pl. I, fig. 1. "Congo River," without definite locality. Type a young male in the London Zoölogical Gardens.

1900. *Semnocebus albigena johnstoni* LYDEKKER, Novit. Zool., Tring, VII, pp. 595–596. Northern end of Lake Tanganyika. Exact locality unknown. Type a very young animal sent alive to the London Zoölogical Gardens.

1900. *Semnocebus albigena rothschildi* LYDEKKER, Novit. Zool., Tring, VII, pp. 595–596; 1901, VIII, Pl. I, fig. 2. Exact type locality unknown. Based on a very young specimen in the London Zoölogical Gardens.

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[1] Elliot (1913, 'Rev. Primates,' II, (1912), pp. 261–263), disregarding the rule "Once a synonym always a synonym," wrongly substituted the specific name *æthiops* (*Simia æthiops* Schreber, not of Linnæus) for *Cercocebus fuliginosus* E. Geoffroy, he affirming that because *Simia æthiops* Linnæus is a *Lasiopyga* (=*Cercopithecus*) and *Simia æthiops* Schreber is a *Cercocebus*, "there is no law known that forbids the same specific name to be given to two species of different genera," he overlooking the fact that Schreber's use of the name *Simia æthiops* was simply a misidentification of *Simia æthiops* Linnæus.

1906. *Cercocebus hamlyni* POCOCK, Ann. Mag. Nat. Hist., (7) XVIII, September, p. 208, Pl. VII. "Upper Congo, exact area unknown." Described "from a living female specimen, still with milk dentition."

1906. *Cercocebus jamrachi* POCOCK, Ann. Mag. Nat. Hist., (7) XVIII, December, p. 454, Pl. XI (animal). "Molinga (? Mlungu), Lake Mweru." Described from a young male living in the Zoölogical Society's Gardens, London. = *Semnocebus albigena johnstoni* Lydekker (cf. Schwarz, 1910, Ann. Mag. Nat. Hist., (8) V, p. 529).

1910. *Cercocebus albigena zenkeri* SCHWARZ, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 456. Bipindi, on the Lokundje River, Cameroon. Type an adult male skin and skull.

1913. *Cercocebus (Leptocebus) albigena ituricus* MATSCHIE, Rev. Zool. Africaine, II, February, p. 208. Type, a male, from between Beni and Irumu, Ituri Forest. Based on "12 Felle mit 11 Schädeln, von Herrn Major Powell-Cotton im Gebiete des oberen Ituri erlegt und jetzt im Museum zu Quex bei Birchington." (Measurements of 8 adult skulls, p. 212.)

1913. *Cercocebus albigena ugandæ* MATSCHIE, Rev. Zool. Africaine, II, February, p. 210 (in text). Entebbe, Uganda. Type an adult male skin and skull. = *Semnocebus albigena johnstoni* Lydekker.

1913. *Cercocebus (Leptocebus) albigena weynsi* MATSCHIE, Rev. Zool. Africaine, II, February, p. 211. Sanga, Mayombe District, Belgian Congo. Type a mounted specimen with skull in the skin. = *Presbytis albigena* Gray.

1914. *Cercocebus fumosus* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 341. Northwest of Beni, Semliki River, Belgian Congo. Based on an adult female skin and skull.

1914. *Cercolophocebus cœlognathus* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 342. Near Kindu, on the Lualaba River, Belgian Congo. Type an immature female, skin and skull.

1915. *Cercocebus oberlænderi* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LII, p. 172. Near Mawambi, Ituri Forest, Belgian Congo. Three specimens, all from the same troop. Type not designated. See also Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 230, Pl. XV, figs. 5, 6 (skull). Claimed to be distinct from *C. fumosus* Matschie (1914), from Beni.

The small group of African monkeys commonly known as mangabeys have an interesting and in some respects rather a peculiar history, from the fact that the greater part of the twenty-five described forms have each had for their original basis a single immature example, kept for a time in confinement, and the original habitat either quite unknown or conjectural. In very few cases was the type specimen an adult animal, or from a definitely known locality. Besides this, a singularly large proportion of these type examples have turned out to be merely albinistic, as later revisers have been able to prove. Prior to the beginning of the present century even the best known of the forms were represented in collections by only a few specimens.

The mangabey group appears to have been first made known by Buffon and Daubenton in 1766 ('Hist. Nat.,' XIV, pp. 244–257, Pls. XXXII and XXXIII), who described and figured two individuals, a male and a female, wrongly supposed to have been obtained in Madagascar. One of them differed from the other in having a white collar and white on the cheeks and front of the lower jaw. The one without the white collar is figured on Plate XXXII as "Le Mangabey," the other on Plate XXXIII as "Mangabey à collier blanc." The difference in color shown by the two specimens the authors thought might be due to age and sex rather than to difference of species.

Buffon, in a footnote to the name Mangabey (*loc. cit.*, p. 244), added to his comment on the name a partial transcript of the description of Linnæus' *Simia æthiops*, from the tenth edition (1758) of the 'Systema Naturæ.' The inference is that Buffon considered *Simia æthiops* the same species as the mangabey. In any case this probably led to the identification of Buffon's mangabey with *Simia æthiops* Linnæus by Schreber nine years later (1775, 'Säugthiere,' I, p. 105, Pl. XX).[1]

Buffon's "Le Mangabey," the *Simia æthiops* of Schreber (not of Linnæus), appears to have been first specifically named by E. Geoffroy in 1812 (Ann. Mus. Hist. Nat., Paris, XIX, p. 97), whose *Cercocebus fuliginosus* rests entirely on Buffon and Daubenton's description and figure (Pl. XXXII) of the mangabey. If there was a type specimen of Geoffroy's *C. fuliginosus* the fact is not indicated in the description, nor has the existence of such a type been shown.[2] This being the case it would seem reasonable to regard *C. fuliginosus* E. Geoffroy as indeterminate having been based on a specimen from an unknown locality.

Kerr, in 1792 ('Anim. Kingd.,' p. 67, No. 39) named the "Mangabey à collier blanc" of Buffon *S[imia] Cercopithecus æthiops torquatus*, which is the earliest available specific name for any mangabey. Similar specimens from "West Africa" became later the basis of the names *æthiopicus* F. Cuvier (1821) and *Cercocebus collaris* Gray (1843). Previously a wholly white mangabey, also from an unknown locality, was named *Simia atys* by Audebert (1797). As shown below, the mangabeys of the *albigena* and *aterrimus* groups are now known to be especially subject to albinism.

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[1] See the fuller discussion of *Simia æthiops* Linnæus below (pp. 333–335).

[2] Geoffroy's entire account of his *Cercocebus fuliginosus* is as follows:

"I. C. enfumé. *Cercocebus fuliginosus*.

"Pelage brun-enfumé: sans taches sur la tête et le cou: les paupières supérieures blanches,

"*Simia æthiops*. Lin. Gm.
Mangabey. Buff., 14, fig. 32.
Mangabey. Aud., fam. 4, sect. 2, fig. 9.
Simia æthiops. Schreb., fig. 20.

"Habite. . . non à Madagascar; ce qui sur un renseignement inexact a été cru par Buffon."

In other words, it is "Le Mangabey" of Buffon, without the mention of any actual specimen. It is therefore not surprising that Elliot (1913, 'Rev. Primates,' II, (1912), p. 262) should not have found the type in Paris. He says: "The type of E. Geoffroy's species is not to be found in the Paris Museum, the oldest [specimen] there being one which died in the Menagerie in 1821, nine years after the species was described, but no indication is given as to whether it was the type or not."

The first species of the mangabey group described from a wild specimen from a definitely known locality appears to have been *Cercopithecus lunulatus* Temminck (1853), collected by the explorer Pel on the Gold Coast.[1] As said by De Winton in 1902: "For some unknown reason *Simia æthiops* has been applied by most modern writers to a species of mangabey (*Cercocebus*) . . . The Mangabey referred to has no claim, therefore, to the name *æthiops*, and should be called *Cercocebus lunulatus*, Temm."[2] = *S. Cercopithecus æthiops torquatus* Kerr, the first available name and based upon Buffon's "Mangabey." Used for specimens from Sierra Leone and Liberia; *C. lunulatus* being from the Gold Coast.

Only three other forms of the twelve described between 1853 and 1910 were based on wild-killed specimens from definitely known localities: *galeritus* Peters (1879), *agilis* Rivière (1886), *zenkeri* Schwarz (1910). The others were based on young specimens (some of them with only the milk teeth) received alive at menageries from unknown localities, usually given as "Upper Congo." The five of the six added later (1913–1915) were founded on one or more adult specimens from known points. Most of these forms come within the scope of the present paper and are referred to in more or less detail below.

The mangabeys (*Cercocebus*) have recently been revised by two authors, Pocock in 1906[3] and Elliot in 1913.[4] Elliot's revision includes one form described after the publication of Pocock's paper. Pocock recognized twelve forms (ten species and two additional subspecies). Elliot reduced the same forms to nine species and two subspecies, two of Pocock's species described as new being placed in synonymy by Elliot, on the ground that both were based on albinistic menagerie specimens from unknown localities.

While there is close agreement between these two authors as to the number of forms entitled to recognition and their status, there are several important discrepancies in nomenclature, due to the determination of the name *Simia æthiops* as used by Linnæus, Schreber, E. Geoffroy, and later authors, as shown in the following tabular comparison. Elliot recognized two subgenera, *Cercocebus* and *Lophocebus*, placing under the latter the *albigena-aterrimus* group. A tabular comparison of the results of these two revisions follows.

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[1] Elliot says (1913, 'Rev. Primates,' II, (1912), p. 263), "The type of *C. lunulatus* Temm. is not in the Leyden Museum, nor any specimen bearing that name." This is perhaps not strange, if we recall that Schlegel (1876, 'Les Singes,' Mus. Hist. Nat Pays-Bas, VII, p. 96) synonymized *Cercopithecus lunulatus* Temminck with his *Cercocebus æthiops*, citing under the latter five specimens, all from Côte d'Or, four of them credited to "voyage de Pel." The same specimens are listed by Jentink in 1892 ('Cat. Syst. Mamm,' Mus. Hist. Nat. Leyden, XI, p. 25) in the same way—as *Cercocebus æthiops* Linnæus.

[2] 1902, in Anderson, "Zool. Egypt,' Mamm., p. 15.

[3] Pocock, R. I. 1906, 'On the Genus *Cercocebus*, with a Key to the known Species.' Ann. Mag. Nat. Hist., (7) XVIII, October, pp. 278–286.

[4] Elliot, D. G. 1913, 'Rev. Primates,' II, (1912), June, pp. 254–272, Pl. xxviii (skull of *Cercocebus torquatus*), Pl. xxix (skull of *Cercocebus aterrimus*), Pl. ix (front view of *C. torquatus* and *C. albigena*).

Species and Subspecies of *Cercocebus*

POCOCK, OCTOBER 1906 Genus *Cercocebus*	ELLIOT, JUNE 1913 Subgenus *Cercocebus*
1. *C. fuliginosus* E. Geoffroy	1. *C. torquatus* (Kerr) Syn. *æthiops* E. Geoff., not Linnæus, not Schreber Syn. *æthiopicus* F. Cuvier Syn. *collaris* Gray
2. *C. lunulatus* (Temminck) Syn. *C. æthiops* Geoffroy, not Linnæus	2. *C. æthiops* (Schreber), not Linnæus Syn. *C. fuliginosus* E. Geoffroy
3. *C. æthiopicus* F. Cuvier Syn. *collaris* Gray	3. *C. lunulatus* (Temminck) Syn. *æthiops* I. Geoffroy
4. *C. chrysogaster* Lydekker	4. *C. chrysogaster* Lydekker
5. *C. hagenbecki* Lydekker	5. *C. hagenbecki* Lydekker
6. *C. agilis* Rivière	6. *C. agilis* Rivière
7. *C. galeritus* Peters	7. *C. galeritus* Peters
	Subgenus *Lophocebus*
8. *C. albigena* (Gray) Syn. *aterrimus* Oudemans	8. *C. albigena* (Gray)
8*a*. *C. albigena johnstoni* Lydekker	8*a*. *C. albigena johnstoni* Lydekker Syn. *jamrachi* Pocock, December 1906
8*b*. *C. albigena rothschildi* Lydekker	8*b*. *C. albigena zenkeri* Schwarz
9. *C. congicus* Sclater	9. *C. aterrimus* (Oudemans) Syn. *congicus* Sclater Syn. *albigena rothschildi* Lydekker Syn. *hamlyni* Pocock
10. *C. hamlyni* Pocock	

The mangabeys, like the guenons, vary considerably in external characters, as coloration, nature of the pelage, and especially the development or absence of hair tufts and crests on the head. Several subgenera based on such differences have been proposed and have met with acceptance by some authors and considered needless by others. Elliot employed two, *Cercocebus* and *Lophocebus*, and made a full genus (*Rhinostigma*) for the little known *Cercopithecus hamlyni* Pocock. No characters of generic or even subgeneric importance have been alleged for it, this genus even now being known only from three young specimens in captivity. It is certainly closely related to the *Lophocebus* group. Matschie's proposed subgenus (or genus, as he employed it with both values) *Cercolophocebus* is superfluous.

Note on *Simia æthiops* Linnæus

Linnæus' *Simia æthiops* was exclusively based on Hasselquist, who states that the Ethiopian monkey was brought down to Egypt from Ethiopia in numbers by the negroes. Linnæus' original description of this monkey in Hasselquist's 'Iter Palæstinum' (1757, p. 190) is, in part, as follows:

> Color: Caput, Dorsum, Latera, Cauda & Crura supra ex cano & viridescente mixta. Facies nigrescens. Abdomen, gula & crura subtus candida. Crura anterius cana. Cauda subtus ferrugina. Linea candida tenuis, proxime super supercilia, transversaliter per frontem extensa.

In this description there is no mention of white eyelids, as there is in the later versions. The phrase "Palpebra superior nuda, alba" is added first in the tenth edition of the 'Systema Naturæ' (1758, p. 28, No. 14), repeated in the 'Museum Adolphi Friderici' (1764, II, p. 4), and in the twelfth edition of 'Systema Naturæ' (1766, p. 39, No. 19), where it appears as "Palpebræ superiores albæ." The original description is the most detailed and fullest; it is greatly abridged and otherwise altered in the tenth edition of the 'Syst. Nat.'; again expanded and modified in the 'Museum Adolphi Friderici,' and again abbreviated and altered in the twelfth edition of the 'Syst. Nat.,' where *æthiops* is given the status of a variety under *Simia cephus*, with "Habitat in Guinea" instead of "in Æthiopia." It is thus not the *Simia æthiops* of Hasselquist's 'Iter Palæstinum,' nor of the tenth edition of the 'Syst. Nat.,' which is obviously based exclusively on the description in Hasselquist. Furthermore, no mangabey is known from the region whence Hasselquist's Ethiopian monkey could have been brought. If the twelfth edition of Linnæus' 'Syst. Nat.' be taken as the final basis of *æthiops*, the species became so transformed as to be meaningless. If taken from the tenth edition, where its sole basis is Hasselquist, it is clearly the *Cercopithecus* (= *Lasiopyga*) of the Nile Valley, and by no possibility a mangabey.

De Winton, in Anderson's 'Zoology of Egypt' (1902, Mamm., p. 15) thus correctly and emphatically stated the case as follows:

> There can be no question as to the species indicated by Linnæus in his account of Hasselquist's journey to Egypt and Palestine, published after the death of that traveller. In the 10th edition of the 'Systema Naturæ' the same name (*S. æthiops*) is applied to this animal, which is unquestionably the green monkey [*Lasiopyga æthiops* Linnæus] of the Upper Nile Valley and Abyssinia. In the 12th edition of the 'Systema' Linnæus unfortunately only mentions this name in connection with a variety of another species from West Africa. . . .

For some unknown reason *Simia æthiops* has been applied by most modern writers to a species of Mangabey (*Cercocebus*). There is nothing in the original description applicable to any member of that genus, while every word agrees perfectly with the monkey under notice, which, as Hasselquist mentions, is so frequently seen in captivity in Egypt. It has been said, in excuse for this view, that Linnæus described the *eyelids* as white. This is an error for not only did the white band mentioned not affect the *eyelids*, but it was placed *above the eyebrows*. The description runs: "linea candida tenuis, proxime super supercilia, transvaliter per frontem extensa."[1] The Mangabey referred to has no claim, therefore, to the name *æthiops*, and should be called *Cercocebus lunulatus* Temm.[2]

The confusion of *Simia æthiops* with the mangabeys in technical nomenclature began with Schreber in 1775 ('Säugthiere,' I, p. 105, Pls. XX and XXI), who adopted the name from Linnæus but, misled probably by Buffon, confounded it with Buffon's Le Mangabey. Schreber's *Simia æthiops* was composite, his citations including Linnæus while his description and plates were based on Le Mangabey of Buffon (1766, 'Hist. Nat.,' XIV, pp. 244–257, Pls. XXXII and XXXIII). Schreber's plates are accredited copies of Buffon's. Erxleben, Gmelin, and many later authors continued the confusion, which still persists (e.g., Elliot, 1913), the name *æthiops* of Linnæus having incorrectly been replaced by *Cercopithecus griseoviridis* Desmarest (1820).

Buffon (*loc. cit.*, p. 244 and footnote) says of his Le Mangabey: "Nous avons eu deux individus (pl. XXXII & XXXIII) de cette espèce de Guenons ou Singes à longue queue; tous deux nous ont été donnés sous la dénomination de *Singes de Madagascar*. . . ." He says in a footnote to the name Le Mangabey: "*Mangabey*, nom précaire que nous donnons à cet animal en attendant qu'on sache son vrai nom; comme il se trouve à Madagascar, dans les terres voisines de Mangabey, cette dénomination en rappellera l'idée aux Voyageurs qui seront à portée de le voir & de s'informer du nom qu'il porte dans cette île qui est son pays natal." These statements are followed by an abridged transcript of Linnæus' description of *Simia æthiops* from his "Syst. nat. edit. X, page 28," which includes the phrase "palpebra superior, nuda, alba." As shown above, this misleading and erroneous characterization is not present in the original description given in Hasselquist. There can be no further doubt that the correct name for Hasselquist's Egyptian guenon is *Simia æthiops* Linnæus = *Lasiopyga æthiops* (Linnæus) with *griseoviridis* Desmarest as synonym; the first available name for Buffon's Mangabey is as previously stated (p. 330) *S. Cercopithecus æthiops torquatus* Kerr = *Cercocebus torquatus* (Kerr).

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[1] [This quotation is from the original description in Hasselquist, and does not occur in either edition of Linnæus' 'Syst. Nat.,' as is shown on a preceding page.]

[2] *C. lunulatus* is the species from the Gold Coast, whereas the first available name for the mangabey based upon *S. æthiops* Linnæus is *S. Cercopithecus æthiops torquatus* Kerr.

A recent revision of the *Simia æthiops* group by Wettstein[1] is of interest in the present connection. Wettstein recognizes two very different groups of species of green monkeys (guenons; subgenus *Chlorocebus*) in northeast Africa, one northern, the other southern, each comprising a number of forms, to each of which he gives the rank of species (*loc. cit.*, p. 639). The northern is brownish yellow above and without an evident green tone; the southern group has the upperparts distinctly green or yellowish green. The range of the northern group is given as North Abyssinia, Eritrea and the Atbara region, and also the lower Blue Nile and the White Nile below Khartum. He says it comprises three forms, as yet undescribed. The southern group occupies the region between the White Nile and the Blue Nile, extending on the former to Goz Abu Guma, and on the latter north to Wad Medani, but does not reach Kordofan. This group he says also comprises three forms as yet undescribed.

Two females, one adult, the other immature obtained by him near Kadugli, southern Kordofan, form the basis of a new species, *Cercopithecus toldti* (*loc. cit.*, p. 645).

Three species are formally recognized, as follows:

"1. *Cercopithecus* (*Chlorocebus*) *cailliaudi* nov. spec."

Founded on two skins in the Berlin Museum (which, however, at the time he wrote were not, he says, available for description) and on the plate (but excluding the text) of F. Cuvier's "grivet." The type is a specimen collected on the lower Blue Nile by Werne. The species is said to be distinguished from *C. griseoviridis* Desmarest by the absence of a green tone in the color of the upperparts.

"2. *Cercopithecus* (*Chlorocebus*) *griseoviridis* Desm." [= *Lasiopyga æthiops* (Linnæus).]

Four specimens are referred to this species, all from Senaar (right bank of the Blue Nile).

"3. *Cercopithecus* (*Chlorocebus*) *toldti* nov. spec."

Based on two females (only one adult) taken by the expedition at Jebel Rihal near Kadugli, South Kordofan.

Wettstein devotes several pages to the literature and nomenclature of the *Lasiopyga æthiops* group, which are of much historical interest. He, of course, accepts the long current view that *Simia æthiops* Linnæus is a mangabey.

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[1] Wettstein, Otto von. 1918, 'Bearbeitung der auf der Expedition gesammelten Vögel und Säugetiere.' Denkschr. Ak. Wiss. Wien, Math.-Nat Kl., XCIV, (1917), pp. 555–693, Pls. I–IV, text figs. 1–13, and map. Mammals, pp. 638–689 (pp. 84–135 of the author's separata).

Cercocebus agilis Rivière

Plates LXXXIV, LXXXV

Cercocebus agilis (*ex* A. Milne-Edwards, Ms.) Rivière, 1886, Rev. Scient., (3) XII, p. 15. Congo français, without definite locality. Type an adult male, skin and skull (Pousargues). Description merely a brief mention; name credited to Milne-Edwards, from the type specimens in the Paris Museum.

Cercocebus agilis Pousargues, 1896, Ann. Sci. Nat., Paris, (8) III, pp. 229–235. Congo français; 5 specimens, including the type. A detailed description based on this material, and discussion of its relation to *C. galeritus*.

Cercocebus agilis Pocock, 1906, Ann. Mag. Nat. Hist., (7) XVIII, October, p. 282.

Cercocebus agilis Elliot, 1913, 'Rev. Primates,' II, (1912), p. 264. Redescription of the type in the Paris Museum.

Cercocebus chrysogaster Lydekker, 1900, Novit. Zool., Tring, VII, August 20, p. 279, Pl. iii. Based on an immature captive specimen in the Garden of the Zoölogical Society of London, "sent from the Upper Congo." Locality of capture unknown.

Cercocebus chrysogaster Pocock, 1906, Ann. Mag. Nat. Hist., (7) XVIII, p. 280. Interesting comment on the type specimen in amplification of the original description.

Cercocebus chrysogaster Elliot, 1913, 'Rev. Primates,' II, (1912), p. 264. Redescription of the type, without comment.

Cercocebus hagenbecki Lydekker, 1900, Novit. Zool., Tring, VII, p. 594; idem, 1901, VIII, Pl. i, fig. 1. Based on a very young captive specimen in the Gardens of the Zoölogical Society of London, "from the Mobangi [Ubangi] River, 300 miles above the junction with the Congo."

Cercocebus hagenbecki Pocock, 1906, Ann. Mag. Nat. Hist., (7) XVIII, p. 281. Redescribed from the type specimen, with comment.

Cercocebus hagenbecki Elliot, 1913, 'Rev. Primates,' II, (1912), p. 265. Redescription from two adult specimens in the British Museum, for which neither sex nor locality is given.

Cercocebus fumosus Matschie, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 341. "Im Urwalde nordwestlich von Beni am Semliki," Belgian Congo. Skin and skull of an adult female.

Cercocebus oberlænderi Lorenz, 1915, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LII, p. 172. Ituri Forest, near Mawambi. Three specimens, adult male and female and a young specimen.

Cercocebus oberlænderi Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 230, Pl. xv, figs. 5, 6 (skull). Maintains its distinctness from *C. fumosus* Matschie, against Matschie's statement in a letter.

Cercocebus sp. (*agilis* group) Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 143. Three native skins in a bad state and received from unknown locality in French Congo (région de la Sanga).

Represented by 36 specimens, collected as follows:

Faradje, 2 (♀ and embryo), November 23, 1911.
Akenge, 13, September 22–October 21, 1913.
Niapu, 19, November 9–December 10, 1913.
Panga, 1, September 21, 1914.
Penge, 1, April 21, 1914.

Twenty of the specimens are fully adult; in eight immature specimens the last molar is undeveloped or only partly up; in six younger immature specimens only the milk teeth are present in four, while in two the first permanent molar is partly up. Males and females are about equally represented. All but two of the series were measured in the flesh, and of two the complete skeleton is preserved.

The external measurements—average (minimum-maximum)—of twenty adults of *Cercocebus agilis*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
10 ♂	1292(1235–1390)	543(515–580)	748(690–785)	177(162–193)	40(35–45)
10 ♀	1117(1035–1190)	473(440–520)	643(590–695)	152(143–159)	38(36–41)

The cranial measurements—average (minimum-maximum)—of nineteen adults of *Cercocebus agilis* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
10 ♂	128.9(122.7–137.0)	98.8(92.5–106.3)	105.2(99.8–109.2)
9 ♀	112.1(100.7–117.6)	83.0(82.0– 86.2)	94.3(90.3– 99.3)

	Zygomatic Breadth	Orbital Breadth	Postorb. Constr.
10 ♂	76.6(81.2–88.5)	68.4(65.0–78.6)	47.8(45.0–49.7)
9 ♀	74.6(71.4–79.0)	58.4(57.0–60.2)	45.7(44.2–47.2)

	Mastoid Breadth	Length Nasals	Upper Toothrow	Upper Molars
10 ♂	68.0(64.3–71.5)	28.8(25.1–31.8)	41.7(40.4–43.6)	22.7(21.7–23.4)
9 ♀	60.7(57.0–64.5)	23.1(21.5–25.8)	37.4(36.5–38.4)	21.7(21.0–22.3)

Immature Pelage.—Young specimens with only the milk teeth developed differ very little in color from adults, but the pelage is softer, shorter and much thinner, with an evident appearance of immaturity. The distribution of the color areas is the same, but usually the tones are rather weaker. The youngest example of all is the only specimen without a skull. Judging from the external measurements, in comparison with those of others which have only the milk teeth, it appears probable that it had not acquired the full milk dentition. The pelage is short and thin, and the darker areas are less dark than in the older examples, except on the hind part of the head, while on the front and sides of the head the second coat has begun to replace the first. In the others next in age none of the natal coat is positively distinguishable.

Sexual Variation.—There is no recognizable sexual color difference in the present species. There is, however, the usual pronounced sexual difference in size and in the dentition and cranial characters characteristic of the mangabeys. In no instance do the external or the cranial measurements of females overlap those of males. (See measurements above, p. 337.)

Individual Color Variation.—In the present large series of specimens (of which thirteen are from Akenge and nineteen from Niapu) the range of purely individual variation in coloration is exceptionally small, consisting in moderate variations in intensity of tone of the pelage as a whole, and of the annulations of the tips of the hairs.

The upperparts are darkish brown, strongly speckled with pale yellow, varying in different individuals from the same localities in the degree of darkness, toned with reddish, which also varies greatly in amount in different individuals strictly comparable as to sex, age and locality. The hairs individually are gray basally and barred apically with narrow bands of light yellowish varying in different specimens from light olive-buff to tawny olive, and also in breadth; usually much broader on the head, nape and shoulders than on the rest of the body and the limbs. In some specimens the head hairs are banded with very narrow and very pale rings, which sometimes do not greatly affect the general tone of coloration while in other comparable specimens the rings are so much broader and so deeply colored as to form the prevailing color.

The underparts and inside of the limbs vary from pale gray or grayish white, or nearly white, to pale yellowish and pale gold. The skin of the under surface of the body, which always shows through the thin pelage, varies from dull brownish gray to deep yellow, and strongly determines the color effect of the underparts.

An indistinct band of pale grayish white extends posteriorly from the base of the ears along the sides of the nape, varying in color from nearly white to pale gray, the hairs individually white or whitish at base passing into gray apically.

In some specimens there is an incipient band on the forehead, particularly in immature specimens, consisting of whitish, or mixed white and black, or wholly black hairs not usually present in old adults.

The amount of black on the upper surface of the tail is extremely variable. While usually blackish, sometimes nearly black medially, the apical eighth or more is much lighter, or grayish, and sometimes (dorsally) wholly black or blackish. The hands are black, the feet dark gray, with a slight mixture of black hairs on the toes. The hair whorl on the front of the head (Pl. LXXXV) is conspicuously present in the greater part of the series, whether adult or immature; it is quite lacking in a few, and only slightly indicated in a few others.

Nomenclature and Distribution.—*Cercocebus agilis* was very briefly and informally indicated by É. Rivière in 1886, from an adult male sent from French Congo by M. de Brazza, no definite locality being indicated.[1] The type, however, was preserved in the Paris Museum, and formed part of the material on which Pousargues based his detailed description of the species in 1896, which included measurements of the type skull. He made a careful comparison of *C. agilis* with *C. galeritus*, on the basis of Peters' description of the latter, reaching the conclusion that *C. agilis* should be regarded as specifically distinct from *C. galeritus* of East Africa. Of the five specimens of *C. agilis* which Pousargues records, definite localities are given for only three of them, of which one was taken at the confluence of the rivers Congo and Ubangi, the other two at the "Poste des Ouaddas," about 400 miles north of the mouth of the Ubangi.

Later authors have added but little to our knowledge of the distribution of the original *C. agilis* as currently understood. Lönnberg (1919) has referred three badly preserved native skins from an unknown locality in French Congo and a young mounted specimen "from Nyangwe" (on the Lualaba River, about 300 miles south of Stanleyville) to the "*agilis* group."

Two supposed species (*chrysogaster* and *hagenbecki* Lydekker) have been based on immature menagerie specimens, from unknown localities, supposed to be somewhere in "Upper Congo"; another has been described from Mawambi (*oberlænderi* Lorenz), and a fourth (*fumosus* Matschie) from Beni, on the Semliki River. The first two have no grounds for serious consideration, and the other two present no alleged characters that are not shown by the present series of specimens from Akenge and Niapu. It is possible that a good series from the type locality of *fumosus* might warrant its recognition as a local race of *agilis;* others may yet remain to be defined, as there is evidence that the *agilis* group has an extended geographic range, as yet imperfectly known.

Pocock (1906) in his remarks on *C. agilis* calls attention to several discrepancies between Pousargues' description of the species and Trouessart's[2] based on the same specimen, adding: "The discrepancies between the two descriptions taken by two authors of repute from the same specimen are difficult to reconcile. They are also highly instructive as emphasizing the magnitude of the personal equation to be reckoned with in judging of species from published diagnoses." Elliot's description, made years later from the same type specimen, differs also in important points from either Pousargues' or Trouessart's, notably in his statement, both "hands and feet black," and in other particulars, thus adding emphasis to Pocock's reference to the "personal equation" in descriptions by different authors of the same specimens, not to mention species. Besides this is the difference in color effect of the same specimen in different lights, as a morning and afternoon light in the same exposure.

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[1] Rivière attributes the name to Milne-Edwards, but Rivière here first gave it publication.
[2] 1897. Le Naturaliste, p. 9.

Cercocebus chrysogaster and *C. hagenbecki* of Lydekker are both accepted by Pocock, apparently without reservation. He says however of *chrysogaster:* "The describer's statement that this species differs from all other species of *Cercocebus* as well as from all species of *Cercopithecus* in the bright orange coloration of the under surface was made in forgetfulness of the fact that Pousargues had already ascribed a similar coloration to the belly of *Cercocebus agilis*. . . " Under *C. agilis* Pocock says: "I have not seen any specimen which exactly fits the descriptions [of *agilis*], though the latter apply pretty closely to mangabeys we commonly receive from the Congo and call *C. hagenbecki*." Yet owing to certain differences in the prevailing tone of the upperparts and of the annulations of the hairs he separates "the two forms specifically, although strongly suspecting they will ultimately prove to be at most merely local races (that is to say, subspecies) of one and the same species." Elliot, on the other hand, accepts both *chrysogaster* and *hagenbecki* as full species without reservation. Elliot's redescription of *hagenbecki* is from two adult specimens in the British Museum, which differ "from the young in color, in having the head and back more tawny, the yellow markings of the young having changed to tawny." He gives measurements of one of the adult skulls, but does not state where the adult specimens were obtained. His skull measurements indicate an unusually large male, which is exceeded however by one from Akenge in the present series. The type was a young specimen with the milk teeth only.

Cercocebus fumosus Matschie was based on an adult female skin and skull from the forest northwest of Beni. The characters given relate to the color of the annulations of the hairs on the head and upperparts stated to be not yellowish but putty-colored, the presence of a tuft of whitish hair behind the ears, etc., which are individualistic and not racial, being in no way indicative of a local form. Lorenz's *Cercocebus oberlænderi* (1915, *loc. cit.*, p. 172) described a few months later from three specimens (two adult and one very young) from the Ituri forest near Mawambi, likewise lacks distinctive features as a local form. In a later fuller description by Lorenz (1917, *loc. cit.*, p. 230) he defends its distinctness from *C. fumosus* Matschie, against the latter's (in a letter to Lorenz) reference of it to *fumosus*.

Cercocebus albigena ituricus Matschie

Plates LXXXVI, LXXXVII

Cercocebus albigena subsp. *albigena* Pocock, 1906, Ann. Mag. Nat. Hist., (7) XVIII, October, p. 286 (part).

Cercocebus albigena johnstoni (not Lydekker) Schwarz, 1910, Ann. Mag. Nat. Hist., (8) V, p. 530, part; Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 456, part. "Upper Congo." Not "Uganda and Lake Mweru."

Cercocebus albigena [*albigena*] Elliot, 1913, 'Rev. Primates,' II, (1912), p. 266, part. "Congo Free State, West Africa."

Cercocebus (*Leptocebus*) *albigena ituricus* Matschie, 1913, Rev. Zool. Africaine, II, February, p. 208. Ituri Forest, between Beni and Irumu. Type an adult male, skin and skull. Also 11 other specimens from the Upper Ituri, collected by Powell-Cotton.

Cercocebus (*Lophocebus*) *albigena ituricus* Lönnberg, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, p. 37, Pl. xii, figs. 1, 2 (skull). Five specimens from Beni, 2 from Rutshuru.

Cercocebus albigena ituricus Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, pp. 232–235. Four specimens from Moëra (near Beni), two from Ukaika, one from between Mawambi and Irumu.

Cercocebus albigena mawambicus (*ex* Matschie Mss.) Lorenz, 1917, idem, pp. 233–234. Mawambi. Not accepted by Lorenz.

Cercocebus albigena ituricus Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 144. Seventeen specimens from localities between Semliki River in the Ituri district and Bafuka in the Uele District.

Represented by 51 specimens accompanied by 6 skeletons, collected as follows:

Bafuka, 3 (adult ♀), March 13, 25, 1913.

Poko, 1, August 1913.

Akenge, 21, September 27–October 29, 1913.

Niapu, 5 (4 adult, 1 young), November 20–28, 1913.

Medje, 2 (adult ♂ and ♀), April 5, 1910; July 20, 1914.

Gamangui, 8 (7 adult ♂, 1 adult ♀), January 31–February 13, 1910.

Ngayu, 1, December 18, 1909.

Avakubi, 5 (all adult, 4 ♂), October 25, 1908; December 18, 1913; February 12 and August 22, 1914.

Risimu, 3, September 8–11, 1909.

Ukaturaka, 2 (flat skins), April 1915.

The external measurements—average (minimum-maximum)—of twenty-nine adults of *Cercocebus albigena ituricus*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
15 ♂	1462(1365–1510)	576(540–615)	886(820–940)	186(179–196)	39(36–42)
14 ♀	1313(1210–1425)	503(435–580)	810(740–895)	166(155–183)	38(35–40)

The cranial measurements—average (minimum-maximum)—of thirty-five adults of *Cercocebus albigena ituricus* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
20 ♂	126.2(122.4-132.0)	97.8(90.2-104.8)	107.5(103.4-112.0)
15 ♀	116.6(109.6-125.3)	88.9(82.7- 95.5)	100.8(94.2-109.3)

	Zygomatic Breadth	Orbital Breadth	Postorb. Constr.
20 ♂	81.6(79.8-83.6)	62.8(59.8-66.4)	46.4(44.0-49.2)
15 ♀	75.3(71.5-77.7)	57.2(54.4-59.5)	44.7(43.0-47.6)

	Mastoid Breadth	Length Nasals	Upper Toothrow	Upper Molars
20 ♂	68.7(65.5-72.5)	27.1(25.2-31.6)	38.3(36.3-41.5)	20.7(19.0-22.3)
15 ♀	64.8(61.5-69.8)	24.6(21.2-28.4)	34.7(32.4-37.0)	20.2(18.6-21.0)

The series comprises twenty fully adult males and fifteen fully adult females; one other has all the permanent teeth, but the canines are not fully grown; five others have the last molars just breaking through the gum or partly up; the rest are still younger, ranging in age from a few weeks to probably a year or more.

This material thus affords an opportunity to trace the pelage changes from the natal coat to the fully adult condition; also individual variation in a large series of adults, of which fifteen are from a single locality (Akenge), all collected during a period of thirty-one days (September 29–October 29).

Immature Pelage.—The youngest of the series (No. 52602, ♂, Akenge; total length 645 mm., greatest length of skull 75) has not fully acquired the milk dentition, only the incisors having pierced the gum, the canines and molars being below the alveolar plane. The pelage is everywhere uniform black, short and silky. The upperparts of the body, the head, limbs and tail are thickly clothed; the nape, sides of the neck and underparts scantily covered, the skin everywhere showing through the hair. No. 52608 (Pl. LXXXVI, fig. 2), ♂, Akenge (total length 570, greatest length of skull 74) is slightly smaller but at the same stage of tooth development. The skin is not well preserved but evidently is similar to the one above described in coloration and character of pelage.

Two other specimens represent a slightly more advanced stage, the coat being much thicker and longer, the whole body better clothed. The smaller of the two (No. 52610, ♀, Akenge; total length, 660; greatest length of skull, 77) has the milk teeth fully developed except the last molar, the crown of which is still below the alveolar border. The foreneck and chest are still thinly haired. The hairs of the nape and sides of the head have a seal-brown tone at base and black tips, forecasting the adult pattern of coloration. Otherwise the pelage differs from that of the younger stages only in the greater length and thickness of pelage and especially in the lengthening of the hairs of the forehead and superciliary region. The hairs of the occipital region are directed forward.

The other (No. 52605, ♂, Akenge; total length, 720; skull missing) is larger and older. It differs from No. 52610 only in a slight increase in the length and thickness of the pelage, and in the stronger brownish tone of the basal half of the hairs of the nape, sides of the head and neck, and its extension to the sides of the body.

A considerable gap in the series of immature specimens occurs between the example last described and the next in age, a young female from Risimu (No. 52583; total length, 1010 mm.; greatest length of skull, 93.5). In this individual the middle pair of milk incisors has been replaced by the permanent teeth, and the crown of the second permanent molar has reached the alveolar plane. The whiskers are thin and directed backward; the anterior are grayish passing into light brown posteriorly. Soft, fine brown hairs cover the sides of the crown from the front base of the ears posteriorly and merge with those of the nape. The long black hairs of the upper surface of the head are directed backward, and with the softer long brown hairs of the nuchal region form a high occipital crest, the longer hairs of which have a length of 50 to 60 mm. The entire nuchal region posteriorly to the interscapular area is heavily clothed with long, soft, brown hair, which extends laterally to the sides of the neck and thence posteriorly and laterally over the scapulars to the sides of the body and on the arms to the elbows. The foreneck, chest and sides of the ventral area are thinly clothed with dark brown hairs tipped with black, passing into black on the midventral area. Inside of thighs brownish black. The limbs elsewhere intense black, like the tail and back.

Four or five other specimens, mostly from Akenge and of about the same age, are similar in general coloration except that the brown of the nape and shoulders varies in extent in different individuals, especially along the sides of the body and on the ventral surface. These examples are adult as regards their pelage, in some of which it shows abrasion from wear.

With advancing age the cheeks gradually lose the thin covering of hair present in the young, in old age the whole face and interramal region being usually quite nude.

Color Variation in Adults.—Adults vary but little in color tones, but considerably in the extent of the brownish areas. The underparts range from wholly black to wholly brown, the latter varying from dark brown to a much lighter shade. This variation is usually correlated with the extent and tone of the brown of the nape and shoulders. The head, back, limbs and tail are intense black. The nape from the posterior border of the crest to or somewhat beyond the shoulders, as well as the sides of the neck and shoulders, are brown (light seal-brown to pale sepia); this color extends often across the chest and along the sides of the body to a varying extent, and also to the upper arm, sometimes as far as the elbow. The inside of the thighs is usually intense black, but sometimes is toned quite strongly with brown. The hair along the back is black to the base, but toward the lateral border the proximal third or half is often strongly toned with brown, this feature varying in different individuals.

The crest hairs of the head vary in position and length in different specimens, sometimes being placed laterally and forming horn-like tufts, in others massed centrally on the occiput. The hairs of the brow-band are stiff, black, and directed backward; those of the posterior border of the crest are reversed (directed forward) and of greater length than the black hairs.

In adults the hair of the upperparts is directed obliquely backward from the midline of the back, and attains the great length of from 100 to 150 mm. or more. The lower soft brown hairs of the occipital crest have a length of 90 to 110, and the brown shoulder hairs often exceed this length.

Variation in Size and in Cranial Characters.—The following comparisons are based on fully adults, as indicated by the measurements given above (p. 342), the specimens being nearly all from within a radius of less than fifty miles, nearly one-half of them from the same locality.

The males, in both external and cranial measurements, are about one-twelfth larger than the females. There are no obvious sexual differences in coloration or in the length of pelage.

Individual variation in cranial and dental characters is about the same in character and amount as in the *Colobus* monkeys and guenons, and does not here require special consideration, except to call attention to the variability of the last molar in both the upper and lower dentition.

Nomenclature of the *Cercocebus albigena* Group.—The earliest described form of the crested mangabeys (subgenera *Lophocebus* and *Cercolophocebus* of some authors) was described by Gray in 1850 as *Presbytis albigena* (Proc. Zool. Soc. London, p. 77, Pl. xvi, animal) from an immature specimen, supposed to have come from "West Africa," that had lived in the Society's Menagerie. No other specimen is mentioned, nor is there any reference to its cranial characters, sex or age. Gray in 1870 ('Cat. Monkeys, Lemurs, and Fruit-eating Bats,' p. 27) refers to it a specimen collected by Du Chaillu in "the Gaboon," and makes *albigena* the type and only species of his *Semnocebus*, a subgenus of *Cercocebus* (the name being preoccupied was replaced by *Lophocebus* Palmer, 1903). Prior to 1910 *albigena* was often confused with *aterrimus*, as shown by Schwarz (*loc. cit.*, 1910), who did much toward clearing up the relationships of the two forms and their supposed subspecies. Since the publication of his paper on this subject a number of additional forms of the *albigena* group have been described, some of which are doubtless tenable as geographic forms. Several of these, on geographical grounds, require consideration in the present connection. In 1913 Matschie described from the upper Ituri and Lindi Rivers his *Cercocebus albigena ituricus*, his *Cercocebus albigena weynsi* from Sanga, Mayombe District, Lower Congo = *C. a. albigena* (Gray) and his *Cercocebus albigena ugandæ* = *C. a. johnstoni* Lydekker, from the Chagwe forest, Uganda. These three races, two of which become synonyms, appear, on geographical grounds and on their alleged characters, entitled to recognition as regional forms. Since 1913 other names have been given to supposed forms that do not appear to merit recognition, as indicated in the above table of bibliographical references. As *C. albigena ituricus* belongs to the region where the present material was collected, it has been here adopted.

It seems to be currently accepted that *C. albigena albigena* is the form of the Lower Congo; *C. albigena ituricus* is the form of the Upper Congo Rain Forest region; while *C. albigena johnstoni* is the form from the forests of Urundi east of Lake Tanganyika to those north of Lake Victoria; *Cercocebus albigena zenkeri* Schwarz from Bipindi represents the southern Cameroon form, with the brown areas light colored, or brownish gray.

As shown above there is a wide range in the extent and tone of the brown areas in individuals from the same locality. Similar variation is mentioned by Lorenz (*loc. cit.*, 1917) as occurring in his specimens from Mawambi, in his discussion of a proposed *C. albigena mawambicus* Matschie, which Lorenz declines to recognize.

The exact limits of the range of *ituricus* cannot be defined, but it appears to extend from Rutshuru and Beni (Lönnberg, Lorenz), north to Irumu and Bafuka, and west to beyond Akenge and Niapu.

Cercocebus aterrimus (Oudemans)

Plates LXXXVIII, LXXXIX, Figure 1

Cercopithecus aterrimus Oudemans, 1890, Zool. Garten, XXXI, p. 267. Stanley Falls, Belgian Congo.

Cercocebus aterrimus Sclater, 1893, Proc. Zool. Soc. London, p. 256, footnote. *Cercopithecus aterrimus* referred to *Cercocebus*.

Cercopithecus aterrimus Jentink, 1895, Proc. Zool. Soc. London, p. 339. Wrongly states that the type of *C. aterrimus*, a young specimen having the molars still undeveloped, "was really a young *Cercocebus albigena*."

Cercocebus congicus Sclater, 1899, Proc. Zool. Soc. London, p. 827, fig. from photo of the living type, in the Antwerp Zoölogical Gardens. "Hab. Terra Congica." Pocock (*loc. cit.*, 1906, p. 286) says the type is "believed to have come from the district of Stanley Falls on the Upper Congo."

Semnocebus albigena rothschildi Lydekker, 1900, Novit. Zool., Tring, VII, p. 596; idem, 1901, VIII, Pl. i, fig. 2. Locality unknown. Based on a living specimen in the London Zoölogical Gardens. An albinistic individual of *C. aterrimus*, according to Schwarz and Elliot.

Cercocebus hamlyni Pocock, 1906, Ann. Mag. Nat. Hist., (7) XVIII, September, pp. 208–210, Pl. vii (animal); idem, October, pp. 285–286. "Upper Congo, exact area unknown." Based on a young female with milk dentition living in the Society's Gardens. = Albinistic example of *C. aterrimus*.

Cercocebus aterrimus Schwarz, 1910, Ann. Mag. Nat. Hist., (8) V, pp. 527–530. Relationship to *albigena*, and critical comment on various supposed forms of *aterrimus* and *albigena*.

Cercocebus aterrimus Elliot, 1913, 'Rev. Primates,' II, (1912), p. 270, Pl. xxix (skull). Redescribes the type specimen, which he states is "only about half grown," and comments on the proneness of this species to albinism.

Cercolophocebus cœlognathus Matschie, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 342. Kindu, Lualaba River, Belgian Congo. Type, and only specimen, a young female, skin and skull.

Cercocebus aterrimus Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 143. Eleven specimens recorded from localities on the Lukenie River and one from the Aruwimi. "Several specimens chiefly from the district of Lake Leopold II in the Congo Museum indicate that this region is the chief habitat of the species."

Represented by two specimens from Stanleyville, collected respectively November 1914 and April 1915. Both are immature, although in respect to coloration and texture of the pelage they have the appearance of adults.

The younger (No. 52631, ♂, April 1915) was purchased alive from the natives. Mr. Lang believes it was brought from some point south of Stanleyville. The external measurements are: Total length, 780 mm.;

head and body, 300; tail vertebræ, 480; hind foot, 114; ear, 38. Only the milk dentition is present.

The principal dimensions of the skull are: Greatest length, 87.5 mm.; occipitonasal length, 81.6; condylobasal length, 58.8; zygomatic breadth, 51.4; mastoid breadth, 54.5; orbital breadth, 43.7.

Whiskers and sides of the neck pale sepia; inside of thighs brown, darker than the cheeks; hair of inside of upper arms and pectoral area toned basally with brown; rest of the pelage deep black, including the nuchal area.

The other specimen (No. 52630, ♂, November 1914; Pls. LXXXVIII, LXXXIX, fig. 1) is older and larger. Total length, 820 mm.; tail, 470; hind foot, 135; ear, 37. Cranial measurements as follows: Greatest length, 95.6; occipitonasal length, 85.3; condylobasal length, 66.0; zygomatic breadth, 59.5; mastoid breadth, 56.4; orbital breadth, 46.3. The milk teeth are all present but much worn, especially the canines and incisors, and the first permanent molar is fully developed. The entire skeleton was preserved as well as the skull and skin. The accompanying photographic illustrations of the external characters were taken from the specimen in the flesh, showing especially the high pointed crown-crest and the long hair on the cheeks, which so strikingly distinguish *aterrimus* from the *albigena* group. The whiskers and soft hair on the sides of the neck are dark brown, much darker and less reddish than in No. 52631; the inguinal region and inside of thighs are faintly toned with brown, but the inside of the upper arms are black; the rest of the pelage is intense black; the black midline of the nape is narrower than in No. 52631. The throat is scantily covered with short gray hairs. The soft, brown whiskers are very long and curve upward over the ears, the longest hairs having a length of 75 mm. The long brown hairs on the sides of the neck, directed upward and inward, nearly conceal the narrow nuchal band of black.

Cercocebus aterrimus is evidently closely related to some of the forms of the *albigena* group but it is here provisionally accepted as a full species. The general resemblance to *C. albigena iluricus* is striking, there being no difference in the color tones, but the brown areas of *ituricus* are much more extended than in *aterrimus*. The presence of the long upcurving whiskers of the latter are, however, in strong contrast with the bare cheeks in the *albigena* group; the peak-like crown tuft is also unlike, in position and form, the occipital (or parieto-occipital) crest in *ituricus*. *C. aterrimus*, so far as known, has a more southern distribution than *C. a. ituricus*. Most of the specimens, so far as the localities were known, recorded prior to 1919, have come from the Stanleyville district, but

Lönnberg's recent records (*loc. cit.*, 1919) carry its range southward to the Lukenie River, and if Matschie's *Cercolophocebus cœlognathus* be referable to *aterrimus*, as seems probable, it extends eastward in about the same latitude to Kindu, on the Lualaba River. Lönnberg records also a specimen from "Aruwimi," about fifty miles north of Stanleyville. Among the fifty-two specimens of *ituricus* obtained by the American Museum Congo Expedition none was collected south of Risimu, a little southwest of Avakubi, although many other kinds of monkey were obtained at stations between Avakubi and Stanleyville.

The records of *aterrimus* show its tendency to albinism, nearly half the specimens thus far recorded, and an especially large proportion of those that have reached menageries, being of this character. Such examples have been the sole basis of several supposed specific or subspecific forms (*congicus* Sclater, *rothschildi* Lydekker, *hamlyni* Pocock). Schwarz, in 1910, (*loc. cit.*, p. 528), stated that eight such specimens were known to him (only one of them with a definite locality), and several have since been recorded from the Antwerp Zoölogical Gardens. Neither of the two specimens recorded in the present paper shows any trace of albinism.

RHINOSTIGMA Elliot

Rhinostigma ELLIOT, 1913, 'Rev. Primates,' II, (1912), June, p. 273, Pl. xxx (skull), Pl. 10 (animal). Type, by monotypy, *Cercopithecus hamlyni* Pocock.

Rhinostigma hamlyni (Pocock)

Plates LXXXIX, Figure 2; XC

Cercopithecus hamlyni POCOCK, 1907, Ann. Mag. Nat. Hist., (7) XX, December, p. 521. "Ituri Forest." Based on an immature animal living in the Gardens of the London Zoölogical Society. It died in 1909 while still young, the permanent dentition being then not fully developed.

Cercopithecus hamlyni POCOCK, 1908, Proc. Zool. Soc. London, September, p. 160 (in text), Pl. 10, fig. 3 (animal, bad figure).

Rhinostigma hamlyni ELLIOT, 1913, 'Rev. Primates,' II, (1912), pp. 273–274, Pl. xxx (skull); Pl. 10 (animal; photograph from life). Made the type of a new genus *Rhinostigma*.

Represented by a young female, No. 52463. The external measurements are: Total length, 700 mm.; head and body, 280; tail vertebræ, 420; hind foot, 110; ear, 35. Greatest length of skull 75. This specimen was purchased alive from a native of Stanleyville but, according to information given to Lang by its former owner, it had been captured a considerable distance south of Stanleyville. The native had secured it from soldiers in Ponthierville who had been previously stationed much farther south, where future explorers may be able to complete its history.

Skin and skeleton, and also photographs from specimen in the flesh (Pls. LXXXIX, fig. 2, XC). The milk teeth are all present (middle upper incisors worn), and the first molar of the permanent set is fully developed.

This specimen closely agrees with the type of *Rhinostigma hamlyni*, as described by Elliot.

The white stripe from between the eyes down the nose to the lips is very conspicuous; on the head the dark gray and black hair is strongly vermiculated with yellowish, the yellow just above the eyes being more predominant; the chin black; throat gray, only slightly speckled with same color as on head. The long soft hair falling from the crown down over the ears and along the cheeks is a very peculiar feature. The color is practically the same down the back to the base of the tail, although it is considerably grayer than on the head; the hairs on the proximal five-sixths of the tail, especially near the root, are tipped with silvery gray, as also on the thighs; the tip of the tail darker. The limbs are black, including hands and feet; on the forearm and leg the yellowish vermiculation is slightly indicated; the flanks are grayish speckled with yellowish. The underparts from breast posteriorly are nearly black with slight yellowish ticking. Plate XC gives an idea of the shortness of the rostrum and the vermiculation of the long, smooth hair about the head.

The type locality of this species is unknown. The type, according to Pocock, "was said to have come from the Ituri Forest." Elliot recorded a second example examined by him in the Gardens of the Royal Zoölogical Society at Antwerp. It was smaller than the one in London, but resembled it closely in color and markings. The American Museum Congo Expedition collected several thousand mammals in the Ituri Forest region, from Stanleyville northward, including some four hundred primates, without either Lang or Chapin meeting with this species.

Rhinostigma hamlyni appears to me to be closely related to the *Lophocebus* section of *Cercocebus*. Elliot first recognized it as a mangabey and not a guenon, as supposed to be by Pocock, its first describer.

LASIOPYGA Illiger

1758. *Simia* LINNÆUS, 'Syst. Nat.,' 10th Ed., I, p. 25 (part, and in part of other early authors).

1762. *Cercopithecus* HAAK (*ex* Brisson), 'Regn. Anim.,' Haak Ed., pp. 133, 137–151, 246. Not available.

1772. *Cercopithecus* BRÜNNICH, 'Zoologiæ Fundamenta,' pp. 34, 40. To include all monkeys with "cauda elongata." Hence equal to *Cercopithecus* Brisson and to *Cercopitheci* Linnæus. The only diagnosis is that afforded in the "Generum Tabulæ Synopticæ." No author is cited for the genus and no species is mentioned.

1777. *Cercopithecus* Erxleben, 'Syst. Regn. Anim.,' p. 22, part. Included 22 species, without designation of type. Type, by subsequent designation, le Callitriche of Buffon and F. Cuvier = *Cercopithecus callithrichus* I. Geoffroy (1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' pp. 18 and 23) = *Simia sabæa* Linnæus.

1811. *Lasiopyga* Illiger, 'Prod. Syst. Mamm. et Avium,' p. 68. Two species: (1) *Simia nemæus* Linnæus, (2) *Simia nictitans* Linnæus. In 1812 *S. nemæus* became the type of *Pygathrix* E. Geoffroy, by monotypy, leaving *S. nictitans* as the sole species and type of *Lasiopyga*, and later type by subsequent designation (Elliot, 1911).

1815. *Cebus* Rafinesque, 'Analyse de la Nature,' p. 53. Substitute name for *Cercopithecus* Erxleben. Not *Cebus* Erxleben, 1777.

1816. *Monichus* (subgenus of *Cercopithecus*) Oken, 'Lehrb. Naturgesch.,' Th. III, Abth. 2, pp. xi, 1208. No type designated. Included three species: (1) *M.*[*onichus*] *C.*[*ercopithecus*] *mona* [Schreber], (2) *C.*[*ercopithecus*] *diana* [Linnæus], (3) *S.*[*imia*] *roloway* [Schreber]. Type, by present designation, *Simia mona* Schreber.

Monichus was evidently founded on *Simia mona* Schreber, the first species of the group. The question arises as to the status of the subsequent generic name *Monachus* Fleming (1822) for a genus of seals. The two names have a wholly different basis, Fleming having adopted an already existing specific name *monachus* (from *Phoca monachus* Hermann) as the name of a genus, while Oken coined the word *Monichus* from the specific name *mona* (*Simia mona* Schreber) with the same termination but with *i* instead of *a* for the connecting vowel. The seal is known in the vernacular as the Monk Seal, the monkey as the *Mona* ("la mone" of Buffon) from the name by which it is said to be known by some of the native tribes of the district whence the first specimens of it were received. The two generic names thus have an entirely different etymological basis, and both should be tenable.

1862. *Petaurista* (subgenus of *Cercopithecus*) Reichenbach,[1] 'Vollständ. Naturgesch. Affen,' p. 105. Type, by tautonomy, *Simia petaurista* Schreber. Preoccupied by *Petaurista* Link (1795) for a genus of Rodents.

1862. *Callithrix* (subgenus of *Cercopithecus*) Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 105. Type, by tautonomy, *Cercopithecus callithrix* I. Geoffroy = *Simia sabæa* Linnæus. Not *Callithrix* Erxleben.

1862. *Diademia* (subgenus of *Cercopithecus*) Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 107. Type, by subsequent designation (Pocock, 1907), *Simia leucampyx* Fischer. Not preoccupied, as generally stated, by *Diadema* Schumacher (1817), a genus of Crustacea; a different name.

1862. *Mona* (subgenus of *Cercopithecus*) Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 109. Type, by tautonomy, *Simia mona* Schreber. = *Monichus* Oken, 1816.

1870. *Chlorocebus* Gray, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' pp. 5, 24, part. Type, by subsequent designation (Pocock, 1907), *Simia sabæa* Linnæus.

1870. *Cynocebus* (subgenus of *Chlorocebus*) Gray, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' p. 26. Type, by monotypy, *Simia cynosuros* Scopoli.

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[1] Reichenbach's 'Vollständ. Naturgesch. Affen' is not at present available for consultation. The references here given are from citations by other authors, some of whom give the date of the work as 1862, others as 1863.

1878. *Diana* (subgenus of *Cercopithecus*) ("Lesson") TROUESSART, Rev. Mag. Zool., (3) VI, p. 124. Type, by tautonomy, *Simia diana* Linnæus. Preoccupied by *Diana* Risso (1826) for a genus of Fishes.

1897. *Rhinostictus* (subgenus of *Cercopithecus*) TROUESSART, 'Cat. Mamm.,' p. 17. To replace *Petaurista* Reichenbach, preoccupied.

1897. *Otopithecus* (subgenus of *Cercopithecus*) TROUESSART, 'Cat. Mamm.,' p. 22. Type, by subsequent designation (Pocock, 1907), *Cercopithecus pogonias* Bennett.

1904. *Pogonocebus* (subgenus of *Cercopithecus*) TROUESSART, 'Cat. Mamm.,' Suppl., p. 14. To replace *Diana* Trouessart (1897), preoccupied.

1913. *Allochrocebus* (subgenus of *Lasiopyga*) ELLIOT, 'Rev. Primates,' I, (1912), pp. xl, lix; II, pp. 296, 297. Type, by original designation, *Cercopithecus l'hoesti* Sclater.

1913. *Neocebus* (subgenus of *Lasiopyga*) ELLIOT, 'Rev Primates,' I, (1912), p. xl; II, pp. 296, 319. Type, by original designation, *Simia cephus* Linnæus.

1913. *Insignicebus* (subgenus of *Lasiopyga*) ELLIOT, 'Rev. Primates,' I, (1912), p. xl; II, pp. 296, 359. Type, by original designation, *Cercopithecus albogularis* (Sykes).

1913. *Melanocebus* (subgenus of *Lasiopyga*) ELLIOT, 'Rev. Primates,' I, (1912), p. lix; II, pp. 296, 306. No type designated. = *Diademia* Reichenbach (1862).

The nineteen generic and subgeneric names proposed for the group of monkeys currently known for a century as *Cercopithecus* (= *Lasiopyga*) are here listed in two categories, those nomenclaturally tenable and those nomenclaturally untenable. *Miopithecus* and *Erythrocebus* are dealt with separately below, since they have been given generic rank by Elliot in his 'Review of the Primates,' and were so more or less currently recognized by some other writers of the last decade.

Tenable Names

1811. *Lasiopyga* ILLIGER. Type, *Simia nictitans* Linnæus.
1816. *Monichus* OKEN. Type, *Simia mona* Schreber.
1862. *Diademia* REICHENBACH. Type, *Simia leucampyx* Fischer.
1870. *Cynocebus* GRAY. Type, *Simia cynosuros* Scopoli.
1897. *Rhinostictus* TROUESSART. To replace *Petaurista*, preoccupied.
1897. *Otopithecus* TROUESSART. Type, *Cercopithecus pogonias* Bennett.
1904. *Pogonocebus* TROUESSART. To replace *Diana*, preoccupied.
1913. *Allochrocebus* ELLIOT. Type, *Cercopithecus l'hoesti* Sclater.
1913. *Neocebus* ELLIOT. Type, *Simia cephus* Linnæus.
1913. *Insignicebus* ELLIOT. Type, *Cercopithecus albogularis* (Sykes).

Untenable Names

1758. *Simia* LINNÆUS, as formerly used for African guenons.
1762. *Cercopithecus*, as formerly used for African guenons.
1815. *Cebus* RAFINESQUE, substitute name for *Cercopithecus*; not *Cebus* Erxleben (1777).
1862. *Petaurista* REICHENBACH, not of Link (1795).

1862. *Callithrix* REICHENBACH. Not *Callithrix* Erxleben (1777). Type, *Simia sabæa* Linnæus, type of *Cercopithecus*.
1862. *Mona* REICHENBACH. Type, *Simia mona* Schreber. = *Monichus* Oken (1816).
1870. *Chlorocebus* GRAY. Type, *Simia sabæa* Linnæus = *Cercopithecus* Erxleben (1777).
1878. *Diana* TROUESSART, not of Risso (1826).
1913. *Melanocebus* ELLIOT, substitute name for *Diademia* Reichenbach.

The taxonomic value of the groups listed above as nomenclaturally available cannot be here discussed owing to lack of necessary material.

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Lasiopyga*

1758. *Simia diana* LINNÆUS, 'Syst. Nat.,' Ed. 10, I, p. 26. "Habitat in Guinea." = Liberia (Jentink). Based primarily on a living individual in confinement.
1758. *Simia cephus* LINNÆUS, 'Syst. Nat.,' Ed. 10, I, p. 27. "Habitat in America" = Africa. Based on "*Cercopithecus barbatus alius guineensis* Marcgr. bras. 228."
1758. *Simia æthiops* LINNÆUS, 'Syst. Nat.,' Ed. 10, I, p. 28. "Habitat in Æthiopia." Based on Hasselquist, hence = Upper Egypt.—Considered by Elliot (1913, 'Rev. Primates,' II, (1912), p. 278) as "Undeterminable." He substituted for it *Cercopithecus griseoviridis* Desmarest (1820), which Anderson (1902, 'Zool. Egypt,' Mamm., p. 13) correctly placed in the synonymy of *æthiops* = *Lasiopyga æthiops*.
1766. *Simia sabæa* LINNÆUS, 'Syst. Nat.,' 12th Ed., I, p. 38. Composite, but mainly the Green Monkey of Edwards (1758, 'Gleanings Nat. Hist.,' I, Pl. CCXV), which he says was "brought from St. Jago, one of the Cape de Verde islands, lying off the Cape de Verde, on the western coast of Africa." As Linnæus cites Edwards the type locality may be given as Cape Verde Islands, to which it was doubtless introduced from Senegal. *Simia sabæa* Schreber (1775, 'Säugthiere,' I, p. 100, Pl. XVIII) is based on the same citations as *S. sabæa* Linnæus, and Schreber's plate is a copy of Edward's Pl. CCXV, and carries the legend "*Simia sabæa* Linn." Elliot (1913, 'Rev. Primates,' II, (1912), p. 334) rejected *S. sabæa* Linnæus as composite, and substituted for it *Cercopithecus callithrichus* I. Geoffroy, which was based on specimens from "Saint Yago, archipel du Cap-Vert." The primary basis of *Simia sabæa* Linnæus and of *Simia sabæa* Schreber are thus essentially the same.
1766. *Simia nictitans* LINNÆUS, 'Syst. Nat.,' 12th Ed., I, p. 40. Type locality "Guinea." Designated by Pocock (1907) as Benito River, Spanish Guinea.
1775. *Simia mona* SCHREBER, 'Säugthiere,' I, p. 97, Pl. XV (copied from Buffon). Based primarily on La Mone, Buffon (1766, 'Hist. Nat.,' XIV, p. 258, Pl. XXXVI). From specimens living in the Paris Menagerie.
1775. *Simia petaurista* SCHREBER, 'Säugthiere,' I, p. 103, Pl. XIX*B*. Name only on Pl. XIX*B*, a copy from Allamand. "Madagascar" = Guinea, West Africa.
1775. *Simia roloway* SCHREBER, 'Säugthiere,' I, pp. 109, 186, Pl. XXV. Name on page 186 and on Pl. XXV, "*Simia Roloway* Allam." Usually this name is attributed to Erxleben (1777, 'Syst. Regn. Anim.,' p. 42), who there quotes Schreber.
1786. *Simia cynosuros* SCOPOLI, 'Delic. Floræ et Faunæ Insubricæ,' pt. 1, p. 44, Pl. XIX. Based on a living specimen; locality of capture not stated.

1799. *Simia ascanius* AUDEBERT, 'Hist. Nat. Singes,' Fam. IV, p. 21, Pl. XIII. Locality unknown. Based on a living specimen in the Paris Menagerie.

1804. *Simia engytitthia* HERMANN, 'Obs. Zool.,' p. 1. Locality not stated. Compared with "*Simia roloway* Linn." and with *S. mona*. Unidentifiable; usually referred to the *Chlorocebus* group.

1820. *Cercopithecus griseoviridis* DESMAREST, 'Mamm.,' I, p. 61. Le Grivet of F. Cuvier. Locality unknown. Based on a living specimen in captivity.

1821. *Simia subviridis* F. CUVIER, Dict. Sci. Nat., XX, p. 27. No locality. New name for *Cercopithecus griseoviridis* Desmarest. = Le Grivet.

1821. [*Simia*] *pygerythra* F. CUVIER, 'Hist. Nat. Mamm.,' II, livr. XXIV, January. Based on a living specimen from an unknown locality in Africa.

1825. "*Cercopithecus pusillus* Delalande" DESMOULINS, Dict. Class. Hist. Nat., VII, p. 568. "Au-delà de Groote-Vis-River au Keiskama," Cafraria, South Africa. (Cf. I. Geoffroy, 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 21.)

1829. *Simia leucampyx* J. B. FISCHER, 'Synop. Mamm.,' p. 20. "La Diane femelle," F. Cuvier, 1824, 'Hist. Nat. Mamm.,' III, livr. xlii. "Guinea."

1831. *Semn. ? albogularis* SYKES, Proc. Zool. Soc. London, August 5, p. 106; *Cercopithecus albogularis*, idem, 1832, p. 18. Based on a living specimen in the Zoölogical Society's Gardens, obtained at Bombay and "believed to have been taken from Madagascar."

1833. *Cercopithecus pogonias* BENNETT, Proc. Zool. Soc. London, September 20, p. 67. Fernando Po, West Africa. Skin without skull.

1833. *Cercopithecus lephrops* BENNETT, Proc. Zool. Soc. London, November 18, p. 109. The Malbrouck of Buffon (not of F. Cuvier). Based on a living specimen in the Gardens of the Zoölogical Society.

1834. *Cercopithecus diadematus* I. GEOFFROY, Bélanger, 'Voy. Indes-Orient.,' Zool., p. 51. = *Simia leucampyx* J. B. Fischer.

1838. *Cercopithecus temminckii* OGILBY, 'Menageries,' I, p. 345. Based on a unique specimen in the Leyden Museum, "said to have been brought from the coast of Guinea."

1838. *Cercopithecus campbelli* WATERHOUSE, Proc. Zool. Soc. London, July, p. 61. Sierra Leone. Skin only.

1838. *Cercopithecus erythrotis* WATERHOUSE, Proc. Zool. Soc. London, July, p. 59. Fernando Po, West Africa. Skin only, lacking face and feet.

1838. *Cercopithecus martini* WATERHOUSE, Proc. Zool. Soc. London, July, p. 58; idem, 1841, p. 71. Fernando Po, West Africa. Two imperfect skins, lacking face, hands and feet.

1840. *Cercopithecus griseus* LESSON, 'Species Mamm.,' p. 81. New name for *C. griseoviridis* Desmarest.

1841. *Cercopithecus tantalus* OGILBY, Proc. Zool. Soc. London, September, p. 33. Locality unknown. Described from a living specimen in the Society's Menagerie.

1842. *Cercopithecus burnettii* GRAY, Ann. Mag. Nat. Hist., (1) X, December, p. 256. Fernando Po, West Africa. Skin, tail imperfect.

1842. *Cercopithecus labiatus* I. GEOFFROY, Compt. Rend. Ac. Sci., Paris, XV, December, p. 1038. "Le Cercopithèque aux lèvres blanches, *Cercopithecus labiatus*, voisin du Hocheur et du *C. Campbelli* de M. Waterhouse." No locality, no definite mention of any specimen.

1842. *Cercopithecus rufo-viridis* I. GEOFFROY, Compt. Rend. Ac. Sci., Paris, XV. December, p. 1038. "Le Cercopithèque roux-vert, *C. rufo-viridis*, voisin du *C, grisco-viridis* et du *C. sabæus*." No locality, no further description.

1843. *Cercopithecus lalandii* I. GEOFFROY, Arch. Mus. Hist. Nat., Paris, II, (1841), p. 561; 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 21. New name for "*C. pusillus* Delalande, Desmoulins, 1825." Based on three specimens from Cafraria, South Africa, collected by Delalande; 1842, Compt. Rend. Ac. Sci., Paris, XV, December, p. 1038 (nomen nudum).

1843. *Cercopithecus monoïdes* I. GEOFFROY, Arch. Mus. Hist. Nat., Paris, II (1841), p. 558, Pl. XXXI. Based on a living specimen in the Paris Menagerie, an adult female from "Africa," without definite locality (I. Geoffroy, 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 19); 1842, Compt. Rend. Ac. Sci., Paris, XV, December, p. 1038 (nomen nudum).

1844. *Cercopithecus samango* SUNDEVALL, Öfvers. Kungl. Vet. Ak. Förhandl., Stockholm, I, p. 160. (Not seen, citation from authors.) Port Natal, South Africa. Based on specimens obtained by Wahlberg (cf. Schlegel, 1876, 'Simiæ,' Mus. Hist. Nat. Pays-Bas, p. 79).

1845. *Cercopithecus melanogenys* GRAY, Ann. Mag. Nat. Hist., (1) XVI, 1845, p. 212; 1849, Proc. Zool. Soc. London, p. 7, Pl. IX. West Africa. Based on "a half-grown specimen which died in a menagerie near London and was said to have come from West Africa."

1848. *Cercopithecus pluto* GRAY, Proc. Zool. Soc. London, p. 56, text fig. and Pl. III. Angola. Based on a living specimen in the Society's Menagerie.

1849. *Cercopithecus ludio* GRAY, Proc. Zool. Soc. London, p. 8, Pl. IX, fig. 2. West Africa. Described from a menagerie specimen.

1850. *Cercopithecus werneri* I. GEOFFROY, Compt. Rend. Ac. Sci., Paris, XXXI, p. 874. Near the "Callitriche des auteurs et du vrai *C. sabæus* [Linnæus]." Based on living animals in the Paris Menagerie. Africa, exact locality unknown.

1850. *Cercopithecus grayi* FRASER, 'Cat. Knowsley Coll.,' p. 8. (Not seen; from citations by other authors.) No type locality; assigned to South Cameroon and neighboring regions by recent authors.

1851. *Cercopithecus callithrichus* I. GEOFFROY, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 23. According to Pocock (1907, Proc. Zool. Soc. London, p. 727) *C. callithrichus* I. Geoffroy is a synonym of *Simia sabæa* Linnæus, and also of *C. werneri* I. GEOFFROY. (See above p. 352.)

1852. *Cercopithecus erythrarchus* PETERS, 'Reise Mossambique,' Säug., p. 1, Pl. I. Not scarce on the plains of Inhambane; less common near Quellimane. Mossambique. Type an immature male. =*C. albogularis* (Sykes).

1852. *Cercopithecus flavidus* PETERS, 'Reise Mossambique,' Säug., p. 3, Pl. I*B*. From Quitangonha, mainland north of Mossambique. Type and only specimen an immature male. (Cf. Matschie, 1893, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 213). =*C. rufoviridis* I. Geoffroy.

1855. *Cercopithecus palatinus* WAGNER, Schreber's 'Säugthiere,' Suppl., V, p. 47. =*C. roloway* I. Geoffroy.

1856. *Cercopithecus erxlebenii* DAHLBOM ET PUCHERAN, Rev. Mag. Zool., (2) VIII, p. 96, idem, 1857, (2) IX, p. 196. Based on a young female that died in the Paris Menagerie, believed to have come from "Afrique occidentale."

1860. *Cercopithecus nigripes* Du Chaillu, Proc. Boston Soc. Nat. Hist., VII, p. 360 "Banks of the Ofoubour River." Male and female described.

1862. *Cercopithecus histrio* Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 106, fig. 260. (Not seen.) Locality unknown. A synonym of *C. ascanius* (Audebert).

1866. *Cercopithecus erythrogaster* Gray, Proc. Zool. Soc. London, p. 169, Pl. xvi. West Africa. Described from a young female living in the Society's Menagerie.

1870. *Chlorocebus engythithea* Gray, 'Cat. Monkeys, Lemurs, and Fruit-eating Bats,' p. 26. "Abyssinia; Sennaar."

1870. *Cercopithecus diana* var. *ignita* Gray, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' p. 22. "West Africa." No definite type locality nor specimen mentioned. Sclater (1893, Proc. Zool. Soc. London, p. 255) records a specimen "brought from the Congo by Capt. Moore-Harper in 1886."

1876. *Cercopithecus neglectus* Schlegel, 'Simiæ,' Mus. Hist. Nat. Pays-Bas, p. 70. "White Nile." New name for *C. leucocampyx* Gray (1870; not *Simia leucampyx* J. B. Fischer, 1829).

1886. *Cercopithecus brazzæ* (*ex* A. Milne-Edwards Ms.) Rivière, Rev. Scient., (3) XII, p. 15. Brief mention of a specimen in the Paris Museum from French Congo. Name attributed to Milne-Edwards.

1886. *Cercopithecus picturatus* Santos, Jorn. Sci. Math. Phys. Nat. Ac. Lisboa, XI, p. 98. West Africa. Described from a living adult male in the Zoological Garden of Lisbon.

1886. *Cercopithecus signatus* Jentink, Notes Leyden Mus., VIII, p. 55. Believed to be "from West Africa, perhaps from Banana." Menagerie specimen.

1886. *Cercopithecus büttikoferi* Jentink, Notes Leyden Mus., VIII, p. 56. "Liberia." A series of eight specimens.

1887. *Cercopithecus boutourlinii* Giglioli, Zool. Anz., X, p. 510. Kaffa, southern Abyssinia. Adult female, skin and skeleton.

1888. *Cercopithecus stampflii* Jentink, Notes Leyden Mus., X, p. 10. "Pessy-country," Liberia. Adult male skin and skeleton.

1891. *Cercopithecus wolfi* Meyer, Notes Leyden Mus., XIII, p. 63. "Central West Africa," exact locality not known.

1892. *Cercopithecus stairsi* Sclater, Proc. Zool. Soc. London, p. 580, Pl. xl. Chindi, Lower Zambesi River. One specimen, sex not indicated.

1892. *Cercopithecus schmidti* Matschie, Zool. Anz., XV, p. 161. Mengo, Uganda. Adult male and subadult female. (See below, p. 410.)

1893. *Cercopithecus stuhlmanni* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 225. Forest north of Kinjawanga, between Lake Albert Edward and Lake Albert. Type and only specimen an old male, skin and skull.

1893. *Cercopithecus fantiensis* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 64, 98. Rio Boutry, Gold Coast, West Africa. Based on one specimen.

1893. *Cercopithecus opisthostictus* Sclater, Proc. Zool. Soc. London, p. 725. Lake Mweru, British Central Africa. "Two flat skins, which appear to have been used as dresses."

1893. *Cercopithecus moloneyi* Sclater, Proc. Zool. Soc. London, p. 252, Pl. xvii. Karonga, north end of Lake Nyasa.

1896. *Cercopithecus albotorquatus* Pousargues, Bull. Mus. Hist. Nat., Paris, II, p. 55. Type locality unknown.

1898. *Cercopithecus l'hoesti* Sclater, Proc. Zool. Soc. London, p. 586, Pl. xlviii. "Congoland." "Chepo or Tschepo in Congoland" (Pocock, 1907). A living specimen, received from the Zoölogical Society of Antwerp.

1898. *Cercopithecus preussi* Matschie, Sitzungsb. Ges. Naturf. Berlin, p. 76. Victoria, Cameroon, West Africa. "Dr. Preuss coll. 4 specimina."

1900. *Cercopithecus centralis* Neumann, Zool. Jahrb., Syst., XIII, p. 533. Bukoba, west shore of Victoria Nyanza. One specimen.

1900. *Cercopithecus omensis* Thomas, Proc. Zool. Soc. London, November 20, p. 801. Mursu, Omo River, about 40 miles north of Lake Rudolf. Adult female, skin and skull.

1902. *Cercopithecus otoleucus* Sclater, Proc. Zool. Soc. London, I, p. 237, Pl. xxv. Latuka Mountains, northern Uganda, "about 100 miles east of the Upper Nile." One specimen.

1902. *Cercopithecus hilgerti* Neumann, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 50. Gobele River, Galla Land, Northeast Africa. Type an adult male. Also female and young male.

1902. *Cercopithecus ellenbecki* Neumann, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 50. Suksuk River, Northeast Africa. Several examples.

1902. *Cercopithecus djamdjamensis* Neumann, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 51. Abera (Djamdjam), Northeast Africa. Adult female.

1902. *Cercopithecus matschiei* Neumann, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 51. Malo on the Omo River. Other specimens from the same region.

1902. *Cercopithecus kolbi* Neumann, Proc. Zool. Soc. London, II, p. 144. Kedong Escarpment, British East Africa. Type an adult male. Also two adult males from the east side of Mount Kenia at 8000 to 9000 feet and in Roromo; and two adult females from Nairobi forest.

1902. *Cercopithecus francescæ* Thomas, Ann. Mag. Nat. Hist., (7) X, p. 243. Near Mount Waller, west of Lake Nyasa. Type an imperfect skin, without skull or feet.

1904. *Cercopithecus sclateri* Pocock, Proc. Zool. Soc. London, Abstr. No. 5, March 22, p. 18; idem, I, p. 433, fig. 87. Benin, Nigeria. Based on the skin of a young male that died in the Zoölogical Gardens.

1905. *Cercopithecus crossi* Forbes, Nature, LXXII, October 26, p. 630. Cameroon, West Africa. Type a subadult male. = *C. preussi* Matschie.

1905. *Cercopithecus kandti* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 264. Volcano country north of Lake Kivu. Three native skins without skulls.

1905. *Cercopithecus thomasi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 262. Near Lake Kivu, Belgian Congo. Type a young female, skin and skeleton.

1905. *Cercopithecus neumanni* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 266. Kwa Kitoto, Kavirondo, British East Africa. Based on two adult females and an immature specimen.

1907. *Cercopithecus denti* Thomas, Proc. Zool. Soc. London, Abstr., January 22, p. 1; idem, June 12, p. 2, Pl. i. Ituri forest, between Mawambi and Avakubi, alt. 3000 feet. Type an adult male, skin and skull.

1907. *Cercopithecus leucampyx nigrigenis* Pocock, Proc. Zool. Soc. London, October 8, p. 692, Pl. xxxix, fig. 1. West Africa, exact locality unknown. Type (unique) a female skin without skull.

1907. *Cercopithecus neglectus brazziformis* Pocock, Proc. Zool. Soc. London, October 8, p. 687. Locality unknown, supposed to be French Congo. Type (unique) a skin only, sex not indicated. A menagerie specimen.

1907. *Cercopithecus leucampyx doggetti* Pocock, Proc. Zool. Soc. London, October 8, p. 691. "S. W. Ankole, between Lakes Victoria and Albert Edward." Type (unique) a young female, skin and skull (Elliot).

1907. *Cercopithecus leucampyx carruthersi* Pocock, Proc. Zool. Soc. London, October 8, p. 691. "Ruwenzori, east side, 10,000 ft." Type (unique) a skin of a female without skull.

1907. *Cercopithecus nictitans laglaizei* Pocock, Proc. Zool. Soc. London, October 8, p. 698. Gaboon. Type (unique) skin and skull, formerly mounted (1913, Elliot, 'Rev. Primates,' II, (1912), p. 317).

1907. *Cercopithecus albogularis beirensis* Pocock, Proc. Zool. Soc. London, October 8, p. 701. "Beira." Two adult males.

1907. *Cercopithecus albogularis rufilatus* Pocock, Proc. Zool. Soc. London, October 8, p. 702. Rufiji River, south of Zanzibar. Two specimens, type not designated.

1907. *Cercopithecus kolbi hindei* Pocock, Proc. Zool. Soc. London, October 8, p. 703, Pl. xxxix, fig. 3. "Tutha, in the Kenia district, 8000 ft. alt." Type a young adult male, skin and skull (Elliot).

1907. *Cercopithecus stairsi mossambicus* Pocock, Proc. Zool. Soc. London, October 8, p. 705. "Mozambique." A single male specimen.

1907. *Cercopithecus rufotinctus* Pocock, Proc. Zool. Soc. London, October 8, p. 706. "British East Africa (?Mombasa)." Type a half-grown skin of a female (Elliot).

1907. *Cercopithecus cephus cephodes* Pocock, Proc. Zool. Soc. London, October 8, p. 724. "Gaboon." Type "a subadult male."

1907. *Cercopithecus tantalus budgetti* Pocock, Proc. Zool. Soc. London, October 8, p. 733. "Uganda: Bathyaba, on the east shore of Lake Albert." Sex of the unique type not indicated.

1907. [*Cercopithecus pygerythrus*] *whytei* Pocock, Proc. Zool. Soc. London, October 8, p. 738. Mount Chiradgula, Nyasaland. Based on a single specimen.

1907. [*Cercopithecus pygerythrus*] *johnstoni* Pocock, Proc. Zool. Soc. London, October 8, p. 738. "Moshi: south side of Kilima Njaro, 5000 ft. alt." Based on two specimens from the type locality.

1907. *Cercopithecus nigroviridis* Pocock, Proc. Zool. Soc. London, October 8, p. 739, Pl. xlii, fig. 5; idem, 1908, Pl. x, fig. 1. Upper Congo, exact locality unknown. Type, the skin of a female that had lived for a year and a half in the London Zoölogical Gardens.[1]

1908. *Cercopithecus ezræ* Pocock, Proc. Zool. Soc. London, Abstr. No. 54, March 3, p 10; idem, September, p. 158, Pl. x, fig. 2. Locality unknown; presumably Upper Congo. Type an immature example living in the London Zoölogical Gardens.

1908. *Cercopithecus albogularis kibonotensis* Lönnberg, 'Wiss. Ergebn. Swed. Zool. Exped. Kilimandjaro-Mweru,' I, No. 2 (1910), Mamm., p. 3. Kibonoto, Kilimandjaro. Based on a series of specimens of adults and young of both sexes.

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[1] [This species has been made the type of a new genus (see below, pp. 418–422).—H. L.]

1909. *Cercopithecus ascanius whitesidei* THOMAS, Ann. Mag. Nat. Hist., (8) IV, December, p. 542. Nsoli, Ikau, Upper Lulanga River, Central Belgian Congo. Type, an adult male, skin and skull.

1909. *Cercopithecus insolitus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 258. "Northern Nigeria," without definite locality. Type, and only specimen, "a young animal," skin and skull.

1909. *Cercopithecus tantalus griseistictus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 259. "Bambara, Welle River," Belgian Congo. Based on an adult male, skin and skull.

1909. *Cercopithecus rubellus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 260. Fort Hall, British East Africa. A number of specimens in the British Museum, sex and age not stated.

1909. *Cercopithecus pogonias pallidus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 261. "Gaboon." No definite type locality. Type, a female; no other specimen cited. Name later corrected to *C. grayi pallidus* (1910, Ann. Mag. Nat. Hist., (8) V, p. 83).

1909. *Cercopithecus sticticeps* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 263. "N'dongo-leti, on the Upper Ubangui River," Belgian Congo. Based on "a single specimen obtained by the Alexander-Gosling Expedition." No skull.

1909. *Cercopithecus silaceus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 263. "East bank of the Loangwa River, Angoniland," British Central Africa. Three specimens are mentioned, from widely separated localities.

1909. *Cercopithecus insignis* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 274. "Congo Forest," without definite locality. Described from a living specimen in the Zoölogical Gardens of Antwerp.

1909. *Cercopithecus princeps* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, September, p. 304. "Mpanga Forest," south of Lake Albert. Type, a skin and skull, age and sex not given, and no other specimen mentioned.

1909. *Cercopithecus tantalus alexandri* POCOCK, Proc. Zool. Soc. London, October, p. 545. Lake Chad. Type a skin without skull.

1910. *Cercopithecus leucampyx aurora* THOMAS AND WROUGHTON, Trans. Zool. Soc. London, XIX, pt. 5, March, p. 485. South end of Lake Kivu. Type an adult male skin (at least no skull is mentioned).

1910. *Cercopithecus inobservatus* ELLIOT, Ann. Mag. Nat. Hist., (8) V, January, p. 81. "West Africa (exact locality unknown)." "Adult male," skin and skull.

1910. *Cercopithecus centralis luteus* ELLIOT, Smithsonian Misc. Coll., LVI, June 11, No. 7, p. 1. Wambugu, southwest of Mount Kenia, British East Africa. Based on two young adult females.

1910. *Cercopithecus kolbi nubilus* DOLLMAN, Ann. Mag. Nat. Hist., (8) V, February, p. 202. Nairobi Forest, British East Africa. Type, an adult female, skin and skull.

1910. *Cercopithecus preussi insularis* THOMAS, Ann. Mag. Nat. Hist., (8) V, February, p. 191. North Bantabiri, Fernando Po, West Africa. Type, an immature female.

1911. *Cercopithecus petronellæ* BÜTTIKOFER, Notes Leyden Mus., XXXIV, December 1, p. 1. Upper Congo? A semiadult female, "said to be imported from the Upper Congo."

1912. *Cercopithecus (Chlorocebus) cynosurus weynsi* Dubois and Matschie, Rev. Zool. Africaine, I, March 31, p. 435. Banana, mouth of Congo. Type, an adult male, skin mounted; also a paratype from Kakongo, skin and skull.

1912. *Cercopithecus (Chlorocebus) cynosurus itimbiriensis* Dubois and Matschie, Rev. Zool. Africaine, I, March 31, p. 437. Itimbiri, northwestern Belgian Congo. Type (and only specimen), a young female.

1912. *Cercopithecus (Chlorocebus) cynosurus tholloni* Matschie, Rev. Zool. Africaine, I, March 31, p. 438 (in text). Near Brazzaville, Congo River. Type and only specimen a skin.

1912. *Cercopithecus (Chlorocebus) æthiops lukonzolwæ* Matschie, Rev. Zool. Africaine, I, March 31, p. 438, fig. 2. Lukonzolwa, Lake Moëro, southeastern Belgian Congo. Type a young male skin.

1912. *Cercopithecus (Otopithecus) denti liebrechtsi* Dubois and Matschie, Rev. Zool. Africaine, I, March 31, p. 439, fig. 3. Stanley Falls, Belgian Congo. Type (and only specimen) an adult male skin and skull.

1912. *Cercopithecus (Otopithecus) elegans* Dubois and Matschie, Rev. Zool. Africaine, I, March 31, p. 440, fig. 4. Probably from Lomami River, Belgian Congo. Type an adult male skin and skull; a paratype (young female) from Aruwimi.

1912. *Lasiopyga pygerythra callida* Hollister, Smithsonian Misc. Coll., LIX, No. 3, March 2, p. 1. South side of Lake Naivasha, British East Africa. Type, an adult male, skin and skull, also four topotypes.

1913. *Cercopithecus (Rhinostictus) schmidti mpangæ* Matschie, Ann. Soc. Zool. Malacol. Belgique XLVII, (1912), August, p. 67. Mpanga Forest, Uganda. Type, a male, skin and skull. Also several paratypes.

1913. *Cercopithecus (Rhinostictus) ascanius omissus* Matschie, Ann. Soc. Zool. Malacol. Belgique, LXVII, (1912), August, p. 68. Manyema?, Belgian Congo. Type and only specimen, an immature female.

1913. *Cercopithecus (Rhinostictus) ascanius cirrhorhinus* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 70. "Aus der Provinz Stanley Falls." Type, an adult male, skin and skull. Also five topotypes.

1913. *Cercopithecus (Rhinostictus) schmidti sassæ* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 72. Sassa (=Isasa River), southeast[1] of Lake Albert Edward. Type, and only specimen, an adult female, skin and skull.

1913. *Cercopithecus (Rhinostictus) schmidti enkamer* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 73. Chima Kilima, north of Mawambi, Belgian Congo. Type, an adult male, skin and skull. Also three paratypes.

1913. *Cercopithecus (Rhinostictus) ascanius kassaicus* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 74. Pogge Falls, Kasai River, Belgian Congo. Type, a young adult female, skin and skull. Also young male topotype.

1913. *Cercopithecus (Rhinostictus) ascanius pelorhinus* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 76. "At Yambuya received," Belgian Congo. Type, and only specimen, an adult female, skin without skull.

1913. *Cercopithecus (Mona) leucampyx schubotzi* Matschie, Ann. Soc. Zool. et Malacol. Belgique, XLVII, (1912), August, p. 78. Mawambi, Belgian Congo.

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[1] [Matschie said "west of Lake Albert Edward." (Cf. Powell-Cotton's itinerary, 1907, Geogr Journ., London, XXX, map opposite p. 468).—H. L.]

Type, an adult male, skin and skull. Also two topotypes and six paratypes from localities in the Ituri Forest, mostly from near Mawambi.

1913. *Lasiopyga leucampax mauæ* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 7. Summit of Mau Escarpment, between Londiani and Sirgoit, British East Africa. Type (unique), an adult male, skin and skull.

1913. *Lasiopyga albogularis maritima* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 8. Mazeras, British East Africa. Type, an adult female, skin and skull; also two other females from the type locality.

1913. *Lasiopyga albogularis kima* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 9. Mount Mbololo, Taita District, British East Africa. Type, an adult male, skin and skull; and nine other specimens, in part topotypes.

1913. *Lasiopyga ascanius kaimosæ* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 10. Near Kaimosi, Upper Lukosa River, British East Africa. Type, an adult male, skin and skull; also a large series of topo-paratypes.

1913. *Lasiopyga pygerythra tumbili* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 10. Ndi, Taita District, British East Africa. Type, an adult male, skin and skull; and 12 other specimens, mostly topotypes.

1913. *Lasiopyga pygerythra arenaria* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 11. Merille waterholes, Marsabit Road, British East Africa. Type, an adult male, skin and skull; also 16 paratypes from the type region.

1913. *Lasiopyga leucampyx sibatoi* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., L, No. 26, December 11, p. 439. Mountain forest northwest of Lake Tanganyika (2000 m.). Type, an old male, skin and skull.

1914. *Lasyopyga schmidti montana* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 17, July 2, p. 357. Territory of the Wabembe, northwest of Lake Tanganyika. Based on six skins from the type locality. No type designated.

1914. *Lasyopyga schmidti ituriensis* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 17, July 2, p. 357. Ituri Forest near Beni and Mawambi. Based on four skins from these localities. No type designated. Referred by Lorenz in 1917 to *C. schmidti enkamer* Matschie.

1914. *Lasyopyga tantalus beniana* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 17, July 2, p. 358. Beni, Belgian Congo. Based on two skins. No type designated.

1914. *Lasyopyga tantalus graueri* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 17, July 2, p. 358. Baraka, northwest shore of Lake Tanganyika. Based on a female skin and skull.

1915. *Cercopithecus pulcher* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LII, No. 14, p. 171. Cameroon, without definite locality. Based on two skins without skull, sex not determinable.

1915. *Cercopithecus thomasi rutschuricus* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LII, No. 14, p. 172. Eastern slope of Mount Rutshuru, altitude 1600 m. Based on skin and skull of an old male. Later (1917) referred by Lorenz to *Cercopithecus thomasi* Matschie.

1916. *Cercopithecus (Chlorocebus) toldti* WETTSTEIN, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LIII, p. 189; 1918, Denkschr. Ak. Wiss. Wien, Math.-Nat. Kl., XCIV, (1917), p. 645. Gebel Rihal near Kadugli, South Kordofan. Type, an adult female; also a cotype, a young female.

1917. *Cercopithecus schmidti rutschuricus* LORENZ, Ann. Naturhist. Hofmus., Wien, XXXI, p. 228, Pl. xv, fig. 2 (skull). Mountain border of Rutschuru Plain. Type, a male, skin and skull. Not *Cercopithecus thomasi rutschuricus* Lorenz, 1915.

1918. *Cercopithecus* (*Chlorocebus*) *cailliaudi* WETTSTEIN, Denkschr. Ak. Wiss. Wien, Math.-Nat. Kl., XCIV, (1917), p. 643. Based on "einige Affenfelle im Berliner Museum und auf die Abbildung (nicht Text) des 'Grivet' in Geoff.-Fr. Cuvier 'Histoire Naturelle des Mammifères 1824'." Type, a female in the Berlin Museum, collected by Werne on the [Lower?] Blue Nile; other specimens referred to it are from North Abyssinia, Eritrea, Atbara basin, Salomona, Tacazze-Biagela, Mograt Island, near Abu Hamed and from Nile Valley to Jebel Ambukol. (Cf. *loc. cit.*, pp. 638–641.)

1919. *Cercopithecus ascanius katangæ* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 122. Kinda, southern Belgian Congo. Based on 11 specimens from Kinda, without designation of type.

1919. *Cercopithecus ascanius orientalis* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 125 (in text). Campi Simba, Zuwani River, British East Africa. Type, a female, incomplete skin without skull.

1919. *Cercopithecus brazzæ uelensis* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 130 (in text). Poko, Uele district, Belgian Congo. Based on three specimens.

1919. *Cercopithecus leucampyx maesi* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 133 (in text). Kutu, Lake Leopold II district, Belgian Congo. Based on a single young specimen with the permanent dentition not fully developed.

1919. *Cercopithecus leucampyx elgonis* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 133. Mt. Elgon, British East Africa. Based on three adult specimens, without designation of a type.

1919. *Cercopithecus pyrogaster* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 137. Atene, Kwango River, Belgian Congo. Type, and only specimen, a young adult female.

1919. *Cercopithecus pygerythrus katangensis* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 141. Funda Biabo, southern Belgian Congo. Type, an old male, skin and skull. Another specimen from Kinda.

1920. *Lasiopyga pygerythra contigua* HOLLISTER, Smithsonian Misc. Coll., LXXII, No. 2, January 22, p. 2. Changamwe, six miles inland from Mombasa, British East Africa. Type, adult male, skin and skull; and two other specimens from the type locality.

MIOPITHECUS I. Geoffroy

1842. *Miopithecus* I. GEOFFROY, Compt. Rend. Ac. Sci. Paris, XV, pp. 720, 1037. Type, by original designation, "Le Talapoin de Buffon" = *Simia talapoin* Schreber ('Säugthiere,' Pl. XVII).

SPECIFIC AND SUBSPECIFIC NAMES REFERABLE TO *Miopithecus*

1775. *Simia talapoin* SCHREBER, 'Säugthiere,' I, p. 101, Pl. XVII (copied from Buffon). Locality unknown. Based primarily on Le Talapoin, Buffon (1766, 'Hist. Nat.,' XIV, p. 287, Pl. XL).

1829. *Simia melarhina* G. CUVIER, 'Règn. Anim.,' Ed. 2, I, p. 92. Cites F. Cuvier, Pl. XVIII, Le Talapoin.

1842. *Miopithecus capillatus* I. Geoffroy, Compt. Rend. Ac. Sci. Paris, XV, p. 720, footnote. ". . . une espèce nouvelle, le Miopithèque chevelu (*M. capillatus*), très-voisin du Talapoin, mais un peu plus grand et à pelage d'un roux légèrement verdâtre." No locality, no further description.

1907. *Cercopithecus talapoin ansorgei* Pocock, Proc. Zool. Soc. London, October 8, p. 742. Cambaca (=Canhoca), Angola. Two specimens, type a male from Canhoca, and a female paratype from Casualalla, North Angola (Elliot).

1919. *Miopithecus talapoin pilettei* Lönnberg, Rev. Zool. Africaine, VII, October, p. 119. Kabawaki, Ruwenzori, altitude 2500 m. Type, a male, skin without skull.

Erythrocebus Trouessart

1897. *Erythrocebus* (subgenus of *Cercopithecus*) Trouessart, 'Cat. Mamm. Viv. Foss.,' I, p. 19. Type, by subsequent designation (Pocock 1907), *Simia patas* Schreber.

1870. *Chlorocebus* Gray, 'Cat. Monkeys, Lemurs, and Fruit-eating Bats,' pp. 5, 24, part.

Specific and Subspecific Names Referable to *Erythrocebus*

1775. *Simia patas* Schreber, 'Säugthiere,' I, p. 98, Pl. xvi (copied from Buffon). Based on Le Patas, Buffon (1766, 'Hist. Nat.,' XIV, p. 208, Pls. xxv, xxvi. Senegal, without definite locality.

1788. *Simia rubra* Gmelin, Linnæus, 'Syst. Nat.,' I, p. 34. New name for *Simia mona* and *Simia patas* Schreber.

1792. *Simia* (*Cercopithecus*) *ruber nigrofasciatus* Kerr, 'Anim. Kingd.,' p. 71, No. 48. "Senegal." A "variety" of *Simia ruber* Gmelin = *Simia patas* Schreber.

1792. *Simia* (*Cercopithecus*) *ruber albofasciatus* Kerr, 'Anim. Kingd.,' p. 71, No. 49. "Senegal." A "variety" of *Simia ruber* Gmelin = *Simia patas* Schreber.

1801. *Simia rufa* Schreber, 'Säugthiere,' Suppl., Pl. xvi*B* (no text).

1829. *Cercopithecus pyrronotus* Hemprich and Ehrenberg, Verhandl. Ges. Naturf. Fr. Berlin, I, p. 407. Kordofan.

1862. *Cercopithecus poliophæus*[1] Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 122, fig. 309. First description of Heuglin's *C. poliophæus*. (Not seen; citations and comment from other authors. Fazogli, Blue Nile, on border of Western Abyssinia.

1862. *Cercopithecus circumcinctus* Reichenbach, 'Vollständ. Naturgesch. Affen,' p. 123, Pl. xxxi, fig. 310. (Not seen.) Locality unknown. Type, a menagerie specimen.

1905. *Erythrocebus kerstingi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 274. Sokode, Togoland, West Africa. Type, a female.

1905. *Erythrocebus zechi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 274. Kete Kradji, western Togoland. Type, a living specimen in the Berlin Zoölogical Gardens.

1905. *Erythrocebus langheldi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 276. Garua, upper Benue River, Cameroon. Type, an immature female.

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[1] Heuglin (1861, Petermann's Mitteilungen, VII, p. 13) mentions an animal of the *C. patas* group discovered by him on the White Nile and in Fazogli, under this name, but without description.

1905. *Erythrocebus baumstarki* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, December, p. 273. Ikomo, east of the southeast end of Victoria Nyanza. Type, a subadult female.

1906. *Cercopithecus patas sannio* Thomas, Ann. Mag. Nat. Hist., (7) XVII, February, p. 173. Yo, Lake Chad. Type, an adult male.

1909. *Erythrocebus albigenus* Elliot, Ann. Mag. Nat. Hist., (8) IV, p. 265. Egyptian Sudan, exact locality not known. Type, an adult male, skin and skull.

1909. *Erythrocebus formosus* Elliot, Ann. Mag. Nat. Hist., (8) IV, September, p. 264. Uganda, particular locality not given. Type, and only specimen, a male skin without skull.

1910. *Erythrocebus whitei* Hollister, Smithsonian Misc. Coll., LVI, No. 2, March 31, p. 11, Pl. II (skull). Nzoia River, Guas Ngishu Plateau, British East Africa. Type, an adult male, skin and skull.

1912. *Cercopithecus* (*Erythrocebus*) *patas albosignatus* Matschie, Rev. Zool. Africaine, I, March, p. 433, fig. 1 (head). Mbomu River, Uele Basin, Belgian Congo. Type, an adult female.

1912. *Cercopithecus* (*Erythrocebus*) *patas poliomystax* Matschie, Rev. Zool. Africaine, I, March, p. 434. Upper Congo, locality unknown. Type, an adult male, skin and skull.

The foregoing list of 174[1] species and subspecies of *Lasiopyga*, *Miopithecus* and *Erythrocebus* described prior to and including 1920 may be divided into six sections, four of which represent quarter centuries.

Periods	Number of Forms
1758–1799	15
1800–1824	5
1825–1850	26
1851–1874	12
1875–1899	17
1900–1920	99

Of these 174 forms about one-fourth had been relegated to synonymy by 1912 (by Pocock in 1907 and by Elliot in 1912, both authors being in practical agreement respecting them). A few described since 1912 have already shared the same disposal, as will doubtless still others when the group is again comprehensively revised.

The above statistical table shows that the number of forms described during the first two decades of the present century greatly exceeds the number described during the preceding century and a half (99 and 75, respectively). This increase is in marked correlation with the increase of material representing this group in the museums of Europe and America since 1905. It may be further noted that nearly two-thirds of the forms described during the last twenty years, or 61 of the 99, have been given trinomial names, indicating geographic forms or subspecies. It is however evident from a study of the literature of this later period, in connection with the large series of specimens of these monkeys from single localities in the Upper Congo region now available for comparison, that many of the names recently proposed for species and subspecies will prove to be superfluous.

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[1] This number is approximate, and will doubtless be increased when all the literature published in 1917–1919 has become available for examination.

During the century from 1758–1857 forty-nine specific and two subspecific names were proposed for African guenons. The first ten (proposed 1758–1775) are still current, as are sixteen others proposed prior to 1857, or twenty-six out of fifty-one. The other twenty-five have passed into synonymy, many of which were intentionally proposed as substitute names, most of them before the B. A. (or Strickland) Code of Nomenclature was promulgated, or when authors felt at liberty to propose names in place of earlier names that failed to satisfy their sense of appropriateness. Others, and these are not few, were given through lack of knowledge of the subject. Most of the names given prior to the eighteenth century were based on the descriptions and illustrations of pre-Linnean or other nonbinomial authors, and nearly all were described originally from living specimens observed in menageries or from preserved specimens derived from such sources. During the first half of the nineteenth century, besides the still available menagerie sources, many species were based on imperfect native-made skins, without skulls, often without feet or the facial portion, and with imperfect tails.

From the geographical point of view the conditions were equally unfortunate. Three-fourths of the species were from unknown or indefinitely known localities, as "Africa," "West Africa," or "West Africa?" Some were even attributed to Madagascar, South America, and East Indies. Prior to 1858 actual localities were given for very few species, as follows: St. Jago, Cape Verde Islands, one; Fernando Po, three; Port Natal, one; Sierra Leone, one; Mozambique, two; Cafraria, 2. With these exceptions there were no type localities for the species described, and their approximate geographic sources have been determined by the later reception of specimens similar to the types from more or less definitely known localities. For the most part no definite type district has been formally assigned to the first described forms, even in cases where subspecies have been assigned to the groups denoted by eighteenth and early nineteenth century names.[1] The practice of basing a species or a subspecies on a single specimen from an unknown locality still continues, about a dozen such forms having been described since the year 1900. A very large part of the species thus far described prove to have been originally founded on single specimens, and often on immature examples. The number of cases when the describer refers to more than one example as having been examined at the time the original description was prepared are relatively few; reference to a series of topotypical specimens is rare, but less so during the last ten or fifteen years than previously.

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[1] The guenons are of course not exceptional in this respect, but it has become more or less the custom with many recent revisers to arbitrarily designate a type locality for the first described form of a group of subspecies with which they find it necessary to deal in a comprehensive way.

Respecting the geographical distribution of the 174 described (or renamed) forms, about 50 were from unknown or conjecturally known localities. Most of these were probably from West Africa, a number from the Upper Congo drainage, a few from East Africa. About thirty were assigned to more or less definitely known localities in West Africa, about forty to definite localities in Central Africa (mainly the drainage basin of the Congo), and about fifty to definite localities in East Africa. Thus about 120 of the forms have satisfactorily known type localities.

Some fifty species and subspecies of guenons have been described from the Belgian Congo and the adjoining border of Uganda, all but five of them during the period 1905–1919. Eight have no type localities, but are recorded as from "Congoland," "Upper Congo," "Congo Forest" or "Ituri Forest." Lönnberg, in an important paper on the monkeys of the Belgian Congo published in 1919,[1] deals with about 175 specimens of guenons in the Congo Museum at Tervueren, of which he records twenty-eight forms (seven as new). Most of the specimens are listed with their respective localities and the name of the collector. Fifteen of the twenty-eight forms are given the status of subspecies, and allotted to seven species; nine additional binomial forms are recognized. Valuable information is given respecting their relationships and individual variation. The numerous localities mentioned cover a wide extent of country, but usually there are few specimens of any form from any single locality, the highest being usually four to six (in one case nine, from Tshopo), in contrast with frequent series of ten to fifteen or more of the same species from single localities, and from fifteen to forty or more from a small district, as in the present Upper Congo collection.

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[1] Lönnberg, Einar. 1919, 'Contributions to the Knowledge about the Monkeys of Belgian Congo.' Rev. Zool. Africaine, VII, pp. 107–154 (*Cercopithecus*, pp. 121–143).

RECENT REVISIONS OF AFRICAN GUENONS

The guenons[1] were revised by Pocock[2] in 1907 and by Elliot in 1913[3] (the manuscript of the latter was transmitted to the printer in June, 1912). In the interval of practically four years between the publication of Pocock's revision and the date to which Elliot brings the subject (only one species described in 1912 is included) twenty-one new forms were described. Deducting these from the number included by Elliot, the following comparison may be made of the two revisions for the period 1758 to 1907. Pocock included all the guenons in the genus *Cercopithecus*, but recognized thirteen groups, indicated by the name of the leading species of each, as "Diana Group," "Neglectus Group," etc. Elliot substituted *Lasiopyga* for *Cercopithecus* and formally recognized three genera and eight subgenera for the forms referred to *Cercopithecus* by Pocock. In the main the subdivisions made by the two authors are equivalent groups, although in three instances two of Pocock's "groups" are combined as one by Elliot. But the order of sequence is radically different, as shown by the following comparison:

POCOCK'S GROUPS	ELLIOT'S SUBGENERA AND GENERA
1. *Diana* group 2. *Neglectus* group 4 species+1 subspecies	8. *Pogonocebus* (subg.) Trouessart 4 species
3. *Leucampyx* group 4. *Nictitans* group 5 species+7 subspecies	3. *Melanocebus* Elliot (new subg.) (=*Diademia* Reichenbach) 11 species+1 subspecies
5. *Albogularis* group 8 species+5 subspecies	7. *Insignicebus* Elliot (new subg.) 11 species+5 subspecies
6. *Mona* group 7 species+1 subspecies	6. *Mona* (subg.) Reichenbach (untenable) (=*Monichus* Oken) 7 species+1 subspecies
7. *L'hoesti* group 1 species+1 subspecies	1. *Allochrocebus* Elliot (new subg.) 1 species
8. *Erythrogaster* group 9. *Petaurista* group 4 species+2 subspecies	2. *Rhinostictus* (subg.) Trouessart 7 species

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[1] Including members of the genera *Lasiopyga*, *Miopithecus* and *Erythrocebus*.

[2] Pocock, R. I. 1907, 'A Monographic Revision of the Monkeys of the Genus *Cercopithecus*.' Proc. Zool. Soc. London, pp. 677–746, Pls. XXXIX–XLII and text figs. 179–193.

[3] Elliot, Daniel Giraud. 1913, 'A Review of the Primates,' (1912), II, pp. 275–382, Pls. 3–8 (colored), Pls. XXXI–XXXIX (skulls), Pl. 11 (2 figs. from life), Pls. 1–4 (heads); III, pp. 1–18, Pls. 1–2 (skulls), Pl. I (fig. from life).

Pocock's Groups	Elliot's Subgenera and Genera
10. *Cephus* group 3 species+1 subspecies	4. *Neocebus* Elliot (new subg.) 4 species
11. *Æthiops* group 8 species+7 subspecies	5. *Chlorocebus* (subg.) Gray 12 species+3 subspecies
12. *Talapoin* group 1 species+1 subspecies	9. *Miopithecus* (gen.) I. Geoffroy 2 species
13. *Patas* group 1 species+1 subspecies[1]	10. *Erythrocebus* (gen.) Trouessart 9 species

Pocock states respecting the status of his "groups": "The application of subgeneric names to these sections is at present, I think, premature, because they rest almost wholly upon color-characters; and if the system be adopted with consistency, it will be necessary to introduce additional names to emphasize the isolation of certain other species, such as *C. neglectus*, *C. l'hoesti*, and possibly *C. nigroviridis*." Elliot, in partial agreement with these suggestions, proposed the new subgenus *Allochrocebus* for the *L. l'hoesti* group, *Melanocebus*[2] for the *L. leucampyx* and *L. nictitans* groups, *Neocebus* for the *L. cephus* group, *Insignicebus* for the *L. albogularis* group. He also combined the *L. diana* and *L. neglecta* groups under *Pogonocebus* Trouessart, the *L. erythrogaster* and *L. petaurista* groups under *Rhinostictus* Trouessart. The *L. mona* group was recognized under the name *Mona* Reichenbach (=*Monichus* Oken), and the *L. æthiops* group under the name *Chlorocebus* Gray. He gave the *C. talapoin* group recognition as a genus under the name *Miopithecus* I. Geoffroy, and the *C. patas* group generic status as *Erythrocebus* Trouessart.

There are naturally many differences in respect to the status and nomenclature of the forms recognized respectively by the two authors for the same period of time (1758–1907), as shown in the table of species and subspecies below. The marginal numbers prefixed to the names indicate the order of sequence. These show at a glance the difference in the order of arrangement in the two revisions. Synonyms are also included to elucidate the rulings of both authors.

The number of forms recognized as valid by Pocock is 69 (42 species and 27 additional subspecies); the number of forms recognized as valid by Elliot is 78 (68 species and 10 additional subspecies). The total number recognized by Elliot (from 1758 to 1912) is 98 (81 species and 17 subspecies), including 21 published after 1907 (indicated by an asterisk prefixed to the marginal number). Twelve of these were described by Elliot, two by Hollister, three by Thomas, and Thomas and Wroughton, and one each by Pocock, Büttikofer, Dollman, and Lönnberg. The number of names assigned as synonyms is 39 by Pocock and 40 by Elliot, but the names thus allocated are not always the same.

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[1] Seven others referred to *Erythrocebus* by Matschie are listed but held in abeyance.

[2] No genotype is indicated for *Melanocebus* but it becomes in effect a synonym of *Diadema* Reichenbach.

Pocock states (*loc. cit.*, p. 680), that the material he had at his disposal was "the skins in the collection of the [Zoölogical] Society and the examples living in the Gardens during the past four years, most of which were deposited for scientific work of this kind by the Hon. Walter Rothschild." He also had "the freest possible access at all times" to the collection in the British Museum. He also says, "I regret that lack of proper material has prevented me making use of skull-characters." Elliot (*loc. cit.*, II, p. 290) comments on this inadequate material which "though considerable in number of specimens, gave the Author no personal knowledge of many species in Continental Museums not represented in the British Museum, and thus placed him at a disadvantage. Cranial characters, which are of supreme importance in the discrimination of species were not considered at all, for the reason as he states, that 'lack of proper material has prevented me from making use of skull-characters,' and so at the outset he was deprived of one of the most important methods of determining species."

Pocock further says: "One great systematic difficulty that I have had to face, and in many cases to leave unsatisfactorily settled, is the decision as to the status, whether specific or subspecific, that should be given to certain forms. This is an extremely difficult point, and one about which probably no two authors will agree. I suspect that most of my present day colleagues will think that I have been too lavish with subspecies, and will consider that the higher rank should have been assigned to them in most cases. Personally, I doubt if in all instances I have gone quite far enough in reducing species to subspecific level."

Elliot comments (*loc. cit.*, p. 292): "Mr. Pocock's method of employing subspecific names is somewhat perplexing, for it is generally understood by Naturalists that a subspecies can only be properly established when there are intergrades between it and a closely related species, Now nearly all the recognized subspecies in this [Pocock's] paper . . . . have no intermediates, and consequently should not be classed as subspecies." Possibly Pocock's view here criticised by Elliot is too liberal, but certainly that of his critic is too narrow and not in accord with the generally accepted view that general conditions, geographical and environmental, as illustrated and well known in hundreds of parallel cases, are entitled to weight in considering the status of closely related forms in cases where actual intergrades are absent but all other indications point to subspecific rather than specific relationship. While Elliot had the advantage of a wider scope of material there is no evidence that he had opportunity to examine a large series of specimens of any one form, much less a large series of any form from a single locality, or was able to bring together for direct comparison examples seen in one museum with those in other museums.

Pocock mentions the *Erythrocebus* group (typified by *C. patas*), as standing out from the others and which "might perhaps with advantage be given full generic status," the living animals being markedly different not only in color but in form. In fact *Erythrocebus* has been accorded full generic rank not only by Elliot but by several other recent authors. It is so treated in the list of the genera, species and subspecies given above in the present paper, and in the detailed consideration of the material of the guenon group collected by the American Museum Congo Expedition, to which material the resources available at the present writing are unfortunately almost wholly restricted.

Species and Subspecies of *Lasiopyga* (=*Cercopithecus*)

Cercopithecus Pocock, 1907	*Lasiopyga* Elliot, (1912) 1913
1. *Diana* Group	8. Subgenus *Pogonocebus*
1. *C. diana* (Linnæus)	64. *L. diana* (Linnæus)
Syn. *diana* var. *ignita* Gray	Syn. *diana* var. *ignita* Gray
2. *C. roloway* (Schreber)	65. *L. roloway* (Erxleben)
Syn. *palatinus* Wagner	Syn. *palatinus* Wagner
2. *Neglectus* Group	
3. *C. neglectus* Schlegel	62. *L. neglecta* (Schlegel)
3*a*. *C. neglectus neglectus*	
Syn. *leucocampyx* Gray (not *leucampyx* Fischer)	
" *brazzæ* M.-Edwards	
3*b*. *C. neglectus brazziformis* Pocock	63. *L. brazzæ* (M.-Edwards)
*3bis. *C. ezræ* Pocock[1]	Syn. *brazziformis* Pocock
	" *ezræ* Pocock
3. *Leucampyx* Group	3. Subgenus *Melanocebus* Elliot [=*Diademia* Reichenbach]
4. *C. leucampyx* Fischer	9. *L. leucampyx* (Fischer)
4*a*. *C. leucampyx leucampyx*	Syn. *diana* F. Cuvier
Syn. *diana* F. Cuvier	" *diadematus* I. Geoffroy

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[1] The asterisk before a number indicates that the species so indicated was described after the publication of Pocock's Monograph.

Species and Subspecies of *Lasiopyga* (=*Cercopithecus*) (*Continued*)

Cercopithecus Pocock, 1907	*Lasiopyga* Elliot, (1912) 1913
Syn. *diadematus* I. Geoffroy	
4*b*. *C. leucampyx stuhlmanni* Matschie	15. *L. stuhlmanni* (Matschie)
Syn. *otoleucus* Sclater	Syn. *otoleucus* Sclater
	16. *L. neumanni* (Matschie)
4*c*. *C. leucampyx carruthersi* Pocock	19. *L. carruthersi* (Pocock)
4*d*. *C. leucampyx doggetti* Pocock	17. *L. doggetti* (Pocock)
	*18. *L. princeps* (Elliot)
	Syn. *stuhlmanni* Pocock, not Matschie
4*e*. *C. leucampyx nigrigenis* Pocock	11. *L. nigrigenis* (Pocock)
Syn. *leucampyx* Sclater (not Fischer)	
4*f*. *C. leucampyx pluto* Gray	10. *L. pluto* (Gray)
4*g*. *C. leucampyx boutourlinii* Giglioli	12. *L. boutourlinii* (Giglioli)
Syn. *omensis* Thomas	Syn. *albogularis* Giglioli (not Sykes)
	" *omensis* Thomas
5. *C. opisthostictus* Sclater	13. *L. opisthosticta* (Sclater)
6. *C. kandti* Matschie	57. *L. kandti* (Matschie)[1]
	*14. *L. aurora* (Thomas and Wroughton)
4. *Nictitans* Group	
7. *C. nictitans* (Linnæus)	20. *L. nictitans* (Linnæus)
7*a*. *C. nictitans nictitans*	
7*b*. *C. nictitans laglaizei* Pocock	20*a*. *L. nictitans laglaizei* (Pocock)
8. *C. martini* Waterhouse	22. *L. martini* (Waterhouse)
Syn. *ludio* Gray	Syn. *ludio* Gray
" *stampflii* Jentink	" *temmincki* I. Geoffroy
" ? *temmincki* I. Geoffroy	" *melanogenys* Schlegel
	" *stampflii* Jentink
	*21. *L. sticticeps* (Elliot)
5. *Albogularis* Group	7. Subgenus *Insignicebus*
9. *C. albogularis* (Sykes)	52. *L. albogularis* (Sykes)
9*a*. *C. albogularis albogularis*	Syn. *monoides* I. Geoffroy
Syn. *erythrarchus* Peters	" *erythrarchus* Peters
9*b*. *C. albogularis beirensis* Pocock	52*a*. *L. albogularis beirensis* (Pocock)
9*c*. *C. albogularis rufilatus* Pocock	52*c*. *L. albogularis rufilata* (Pocock)
Syn. *?monoides* I. Geoffroy	*52*d*. *L. albogularis kibonotensis* (Lönnberg)
9*d*. *C. albogularis albotorquatus* Pousargues	50. *L. albotorquata* (Pousargues)
10. *C. kolbi* Neumann	51. *L. kolbi* (Neumann)
10*a*. *C. kolbi hindei* Pocock	*51*a*. *L. kolbi nubila* (Dollman)
	51*b*. *L. kolbi hindei* (Pocock)

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[1] *L. kandti* is placed by Elliot in his subgenus *Insignicebus*.

Species and Subspecies of *Lasiopyga* (=*Cercopithecus*) (*Continued*)

	Cercopithecus Pocock, 1907		*Lasiopyga* Elliot, (1912) 1913
11.	*C. moloneyi* Sclater	53.	*L. moloneyi* (Sclater)
12.	*C. stairsi* Sclater		
12*a*.	*C. stairsi stairsi*	59.	*L. stairsi* (Sclater)
12*b*.	*C. stairsi mossambicus* Pocock	59*a*.	*L. stairsi mossambica* (Pocock)
		*58.	*L. insignis* (Elliot)
13.	*C. rufotinctus* Pocock	60.	*L. rufotincta* (Pocock)
14.	*C. francescæ* Thomas	54.	*L. francescæ* (Thomas)
15.	*C. preussi* Matschie	55.	*L. preussi* (Matschie)
	Syn. *crossi* Forbes		Syn. *crossi* Forbes
		*55*a*.	*L. preussi insularis* (Thomas)
16.	*C. labiatus* I. Geoffroy	61.	*L. labiata* (I. Geoffroy)
	Syn. *samango* Sundevall		Syn. *samango* Sundevall
	6. *Mona* GROUP		6. SUBGENUS *Mona* [=*Monichus*]
17.	*C. mona* (Schreber)	42.	*L. mona* (Schreber)
18.	*C. campbelli* Waterhouse	45.	*L. campbelli* (Waterhouse)
19.	*C. burnetti* Gray	46.	*L. burnetti* (Gray)
20.	*C. denti* Thomas	43.	*L. denti* (Thomas)
21.	*C. wolfi* Meyer	44.	*L. wolfi* (Meyer)
22.	*C. grayi* Fraser	48.	*L. grayi* (Fraser)
22*a*.	*C. grayi grayi*		Syn. *erxlebeni* Dahlb. and Pucher.
	Syn. *erxlebeni* Dahlb. and Pucher.	*48*a*.	*L. grayi pallida* (Elliot)
22*b*.	*C. grayi nigripes* Du Chaillu		
23.	*C. pogonias* Bennett	47.	*L. pogonias* (Bennett)
		47*a*.	*L. pogonias nigripes* (Du Chaillu)
		*49.	*L. petronellæ* (Büttikofer)
	7. *L'hœsti* GROUP		1. SUBGENUS *Allochrocebus* Elliot
24.	*C. l'hœsti* Sclater	1.	*L. l'hœsti* (Sclater)
24*a*.	*C. l'hœsti l'hœsti*	*2.	*L. insolita* (Elliot)
24*b*.	*C. l'hœsti thomasi* Matschie	56.	*L. thomasi* (Matschie)[1]
	8. *Erythrogaster* GROUP		2. SUBGENUS *Rhinostictus*
25.	*C. erythrogaster* Gray	4bis.	*L. erythrogaster* (Gray)
	9. *Petaurista* GROUP	3.	*L. petaurista* (Schreber)
26.	*C. petaurista* (Schreber)		
26*a*.	*C. petaurista petaurista*		
	Syn. *fantiensis* Matschie	4.	*L. fantiensis* (Matschie)
26*b*.	*C. petaurista buttikoferi* Jentink	5.	*L. buttikoferi* (Jentink)
27.	*C. ascanius* (Audebert)	6.	*L. ascanius* (Audebert)
27*a*.	*C. ascanius ascanius*		Syn. *melanogenys* Gray
	Syn. *melanogenys* Gray		" *histrio* Reichenbach
	" *histrio* Reichenbach		" *picturatus* Santos
	" *picturatus* Santos	*6*a*.	*L. ascanius whitesidei* (Thomas)
27*b*.	*C. ascanius schmidti* Matschie		

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[1] *L. thomasi* is placed by Elliot in his subgenus *Insignicebus*.

Species and Subspecies of *Lasiopyga* (=*Cercopithecus*) (*Continued*)

Cercopithecus Pocock, 1907	*Lasiopyga* Elliot, (1912) 1913
28. *C. signatus* Jentink	7. *L. signata* (Jentink)
Syn. *martini* Sclater, not Waterhouse	Syn. *martini* Sclater (not Waterhouse
	“ *nictitans* Schlegel (part)
	8. *L. schmidti* (Matschie)
10. *Cephus* Group	4. *Neocebus* Elliot
29. *C. cephus* (Linnæus)	23. *L. cephus* (Linnæus)
29*a*. *C. cephus cephus*	24. *L. cephodes* (Pocock)
29*b*. *C. cephus cephodes* Pocock	*25. *L. inobservata* (Elliot)
30. *C. erythrotis* Waterhouse	27. *L. erythrotis* (Waterhouse)
31. *C. sclateri* Pocock	26. *L. sclateri* (Pocock)
11. *Æthiops* Group	5. Subgenus *Chlorocebus*
32. *C. sabæus* (Linnæus)	31. *L. callithrichus* (I. Geoffroy)
Syn. *werneri* I. Geoffroy	Syn. *sabæus* Pousargues (not Linnæus)
“ *callithrichus* I. Geoffroy	32. *L. werneri* (I. Geoffroy)
33. *C. æthiops* (Linnæus)	33. *L. griseoviridis* (Desmarest)
33*a*. *C. æthiops æthiops*	
Syn. *griseoviridis* Desmarest	Syn. *sabæus* E. Geoffroy (not Linnæus)
“ *subviridis* F. Cuvier	“ *griseus* Lesson
“ *griseus* F. Cuvier	
“ *sabæus* I. Geoffroy (not Linnæus)	“ *engythithea* Gray
33*b*. *C. æthiops ellenbecki* Neumann	“ *æthiops* Anderson (not Linnæus)
33*c*. *C. æthiops hilgerti* Neumann	28bis. *L. hilgerti* (Neumann)
	Syn. *ellenbecki* Neumann
34. *C. matschiei* Neumann	28. *L. matschiei* (Neumann)
35. *C. djamdjamensis* Neumann	29. *L. djamdjamensis* (Neumann)
36. *C. tantalus* Ogilby	30. *L. tantalus* (Ogilby)
36*a*. *C. tantalus tantalus*	30*a*. *L. tantalus budgetti* (Pocock)
Syn. ? *chrysurus* Blyth	*30*b*. *L. tantalus griseisticta* (Elliot)
“ ? *sabæus* Reichenbach	*30*c*. *L. tantalus alexandri* (Pocock)
“ ? *callithrichus* Forbes	
“ ? *sabæus* Pousargues	
36*b*. *C. tantalus budgetti* Pocock	
37. *C. cynosurus* (Scopoli)	34. *L. cynosura* (Scopoli)
Syn. *tephrops* Bennett	Syn. *tephrop* Bennett
38. *C. pygerythrus* F. Cuvier	35. *L. pygerythra* (F. Cuvier)
38*a*. *C. pygerythrus pygerythrus*	Syn. *pusillus* Desmoulins
Syn. *erythropyga* G. Cuvier	“ *erythropyga* G. Cuvier
“ *pusillus* Desmoulins	“ *lalandii* I. Geoffroy
“ *lalandii* I. Geoffroy	

Species and Subspecies of *Lasiopyga* (=*Cercopithecus*) (*Continued*)

Cercopithecus Pocock, 1907	*Lasiopyga* Elliot, (1912) 1913
38*b*. *C. pygerythrus rufoviridis* I. Geoffroy	36. *L. rufoviridis* (I. Geoffroy)
Syn. *flavidus* Peters	Syn. *flavidus* Peters
38*c*. *C. pygerythrus whytei* Pocock	*37. *L. rubella* (Elliot)
38*d*. *C. pygerythrus johnstoni* Pocock	*38. *L. callida* Hollister
38*e*. *C. pygerythrus centralis* Neumann	39. *L. centralis* (Neumann)
	39*a*. *L. centralis whytei* (Pocock)
	39*b*. *L. centralis johnstoni* (Pocock)
	*39*c*. *L. centralis lutea* (Elliot)
	*40. *L. silacea* (Elliot)
39. *C. nigroviridis* Pocock	41. *L. nigroviridis* (Pocock)
12. *Talapoin* GROUP	9. GENUS *Miopithecus*
40. *C. talapoin* (Schreber)	79. *M. talapoin* (Schreber)
40*a*. *C. talapoin talapoin*	Syn. *capillatus* I. Geoffroy
Syn. *melarhina* G. Cuvier	" *melarhinus* "Schinz"
40*b*. *C. talapoin ansorgei* Pocock	80. *M. ansorgei* (Pocock)
13. *Patas* GROUP	10. GENUS *Erythrocebus*
41. *C. patas* (Schreber)	66. *E. patas* (Schreber)
41*a*. *C. patas patas*	Syn. *ruber* Gmelin
Syn. *ruber* (Gmelin)	" *ruber nigrofasciatus* Kerr
	" *ruber albofasciatus* Kerr
41*b*. *C. patas pyrronotus* Hemp. and Ehren.	67. *E. pyrronotus* (Hemp. and Ehren.)
	*68. *E. formosus* Elliot
Other forms recognized by Matschie (except *sannio* Thomas) as species of *Erythrocebus* and listed by Pocock at the close of the paper as follows:	69. *E. poliophæus* (Reichenbach) *70. *E. whitei* Hollister 71. *E. kerstingi* (Matschie) 72. *E. zechi* Matschie 73. *E. langheldi* Matschie
rufa Schreber	*74. *E. albigenus* Elliot
circumcinctus Reichenbach	75. *E. sannio* (Thomas)
sannio Thomas	76. *E. circumcinctus* (Reichenbach)
zechi Matschie	77. *E. baumstarki* Matschie
kerstingi Matschie	
langheldi Matschie	
poliophæus Reichenbach	
baumstarki Matschie	

STATUS OF THE GENERIC NAME *Cercopithecus*

Linnæus (1748) in the sixth edition of his 'Systema Naturæ' placed all the primates in his genus *Simia* without division into named groups. Of his sixteen species ten were indicated as species with tails.

Brisson (1756, 'Regn. Anim.,' Tabula, p. 188) was the first author to divide the genus *Simia* into named groups, his divisions are as follows:

SIMIÆ sunt vel
 Ecaudatæ;
  Rostro brevi......*Simia*......Stirps I.
  Rostro productiore......*Simia Cynocephala*......Stirps II.
 Caudatæ;
  Caudâ brevissima......*Papio*......Stirps III.
  Caudâ longâ;
   Rostro brevi......*Cercopithecus*......Stirps IV.
   Rostro productiore....*Cercopithecus Cynocephalus*....Stirps V.

Under Stirps IV, *Cercopithecus*, he placed twenty-nine species, of which nine were new and the remaining twenty were based on preceding authors. Thus *Cercopithecus* included all the long-tailed monkeys of the world then known, by far the greater part of which were from tropical America, but the few African and Asiatic species previously described were also included. The sixth edition of Linnæus 'Syst. Nat.' is uniformly cited in the references. As Brisson's work was published prior to 1758, his generic and subgeneric names are invalid.

Linnæus (1758) in the tenth edition of his 'Syst. Nat.' divided the genus *Simia* into three sections: (1) Cauda nulla: *Simia veterum;* (2) Cauda abbreviata: *Papiones;* (3) Cauda elongata: *Cercopitheci.* The latter included all the long-tailed monkeys, those of the Old World as well as of America, the former comprising macaques as well as guenons. The names of these divisions, however, are in plural form and hence not available as generic (or subgeneric) designations.

A second abridged edition of Brisson's 'Regn. Anim.' was brought out in 1762 by the Dutch publisher Theodore Haak, but, as he states in his introduction, it was his own publication ("hac mea editione") and simply a reprint of the Latin portion of the bilingual original (French and Latin in parallel columns), without change except for small additions of new matter, indicated by insertion between brackets. The original Latin text is otherwise unchanged. It is therefore a republication of the Latin text of the original quarto edition of 1756,[1] and does not give validity to Brisson's genera.[2] The avowed additions by the publisher alone would have validity, but none of these occur in the part devoted to the primates.

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[1] The publisher states that he was induced to issue it in this form in order that it might be more easily carried about and thus serve better the convenience of students interested in the study of this subject.

[2] See 1910, 'International Code of Zoölogical Nomenclature,' Opinion 5, July.

Its relation to the present discussion of the generic name *Cercopithecus* comes through the publication of Gronow's 'Zoophylacium' in 1763,[1] and the contention of Elliot that Brisson's section *Cercopithecus* was validated by Gronow's restriction of it to practically a single species. Elliot assumed that the republication of the Latin text of Brisson's work in 1762 validated Brisson's genera of mammals, overlooking the fact that it was not by Brisson himself as usually taken for granted, but by a publisher named Theodore Haak of Amsterdam in order, as explained above, to make Brisson's work more accessible to students. There is no evidence that Gronow knew of, or made any use of, the 1762 reprint, but contra indication that he did not. The reprint is dated 1762, the first part of the 'Zoophylacium,' containing the mammals, is dated 1763, a folio of 140 pages, of which the mammals occupy only the first nine. Part two of the 'Zoophylacium' (pp. i–iv+141–236) is dated 1764. It is therefore almost certain that the reprint of Brisson was not available at the time the first pages of the 'Zoophylacium,' containing the mammals, were printed. Unfortunately Gronow's citations of Brisson are not by page references but by the genus and species, as "gen. 4, sp. 1" etc., so that these give no clue to whether the citations refer to the original or the reprint. Gronow's title-page explains the scope and purpose of his work: "Zoophylacii Gronoviani Fasciculus primus exhibens Animalia Quadrupeda, Amphibia atque Pisces, quae in Museo suo adservat, rite examinavit, systematice disposuit, descripsit, atque iconibus illustravit." The Animalia Quadrupeda number thirty-five species, distributed under twenty genera, with an additional genus of mammals (*Balæna*) in the order Plagiuri of his Pisces. Only two of the species are monkeys. The classification and sequence of arrangement are strictly Brissonian. Eighteen of the twenty genera of Gronow's mammals are attributed to Brisson, the other two to Linnæus, namely, *Lemur* (=*Prosimia* Brisson) and *Capra* (=*Hircus* Brisson). In reality fourteen of the genera are Linnean and only six Brissonian.

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[1] Gronow's Genera and Species of Mammals in his 'Zoophylacium' (1763, fasc. 1, pp. 1–9), are as follows:

I. *Myrmecophaga* Gronow (ex Brisson = *Myrmecophaga* Linnæus).
  1. = *M. didactylus* Linnæus (by citation of Linnæus, 1758, 'Syst. Nat.,' Ed. 10, gen. 8, sp. 1).
  2. = *M. tridactylus* Linnæus (*loc. cit.*, gen. 8, sp. 2). Type of *Myrmecophaga* Linnæus by restriction.

II. *Pholidotus* Gronow (ex Brisson = *Manis* Linnæus).
  3. = *Manis pentadactyla* Linnæus (*loc. cit.*, gen. 9, sp. 1). Monotypic type of *Manis* Linnæus.

III. *Tardigradus* Gronow (ex Brisson = *Bradypus* Linnæus; not *Tardigradus* Boddaert, 1784 = *Loris* E. Geoffroy, 1796).
  4. = *Bradypus tridactylus* Linnæus (*loc. cit.*, gen. 7, sp. 1). Type of *Bradypus* Linnæus by restriction.

IV. *Cataphractus* Gronow (ex Brisson = *Dasypus* Linnæus).
  5. = *Dasypus novemcinctus* Linnæus (*loc. cit.*, gen. 17, sp. 6). Tautonomic type of *Dasypus* Linnæus.

V. *Elephas* Gronow (ex Brisson = *Elephas* Linnæus).
  6. = *Elephas maximus* Linnæus (*loc. cit.*, gen. 5, sp. 1). Monotypic type of *Elephas* Linnæus.

VI. *Capra* Gronow (ex Linnæus, *loc. cit.*, gen. 31). Tautonomic type, *C. hircus* Linnæus.
  7. = *Capra angorensis* Brisson (1756, 'Regn. Anim.,' p. 64).
  8. = *Capra gazella* Linnæus (*loc. cit.*, gen. 31, sp. 7). Type of *Oryx* Blainville, 1816.

VII. *Cervus* Gronow (ex Brisson = *Cervus* Linnæus).
  9. = *Cervus bezoarticus* Linnæus (*loc. cit.*, gen. 30, sp. 6). The type of *Cervus* Linnæus is fortunately *Cervus elephas* Linnæus by tautonomy. *C. bezoarticus* is the type of *Blastocerus* Wagner, 1844.

VIII. *Sus* Gronow (ex Brisson = *Sus* Linnæus).
  10. = *Sus tajacu* Linnæus (*loc. cit.*, gen. 16, sp. 3). Tautonomic type of *Tayassu* Fischer 1814.
  11. = *Sus scrofa* Linnæus (*loc. cit.*, gen. 16, sp. 1). Tautonomic type of *Sus*.
  12. = *Sus babyrussa* Linnæus (*loc. cit.*, gen. 16, sp. 4). Tautonomic type of *Babiroussus* Gray, 1821.

IX. *Rhinoceros* Gronow (ex Brisson = *Rhinoceros* Linnæus).
  13. = *Rhinoceros unicornis* Linnæus (*loc. cit.*, gen. 22, sp. 1). Tautonomic type of *Rhinoceros* Linnæus.

X. *Cuniculus* Gronow (ex Brisson = *Mus* (part) Linnæus).
  14. = *C. Aguti* Brisson (*loc. cit.*, gen. 23, sp. 2). Based primarily on Marcgrave. Tautonomic type of *Agouti* Lacépède, 1799.
  15. = *C. Paca* Brisson (*loc. cit.*, gen. 23, sp. 4). Based primarily on Marcgrave.
  16. = *Mus porcellus* Linnæus (*loc. cit.*, gen. 26, sp. 1).

XI. *Sciurus* Gronow (ex Brisson = *Sciurus* Linnæus).
  17. = *Sciurus vulgaris* Linnæus (*loc. cit.*, gen. 27, sp. 1). Tautonomic type of *Sciurus* Linnæus.

XII. *Mus* Gronow (ex Brisson = *Mus* Linnæus).
  18. = *Mus rattus* Linnæus (*loc. cit.*, gen. 26, sp. 9).
  19. = *Mus musculus* Linnæus (*loc. cit.*, gen. 26, sp. 10). Tautonomic type of *Mus* Linnæus.

XIII. *Cercopithecus* Gronow (ex Brisson, *loc. cit.*, gen. 29, stirp. 4).
  20. = *Simia midas* Linnæus (*loc. cit.*, gen. 2, sp. 15). Based on the "little black Monkey of Edwards, Aves, p. 196, Pl. 196." Type, by practical monotypy, of *Cercopithecus* Gronow, if tenable from Gronow.
  21. = *Simia faunus* Linnæus (*loc. cit.*, gen. 2, sp. 6) and *Simia morta* Linnæus (*loc. cit.*, gen. 2, sp. 18), neither of which is identifiable.

XIV. *Lemur* Gronow (ex Linnæus, *loc. cit.*, gen. 3).
  22. = *Lemur macaco* Erxleben (1777, 'Syst. Regn. Anim.,' gen. 7, sp. 3). Not a Linnean species. Gronow's citations for the species are, (1) *Prosimia fuscus* Brisson, gen. 31, sp. 1; and (2) *Simia sciurus* Petiver, "Gasoph., tab. 17, fig. 5." The latter is the sole basis of Brisson's *Prosimia fuscus*. Linnæus' only citation for *L. catta* is Edwards, Aves, p. 199, Pl. 199.

XV. *Vespertilio* Gronow (ex Brisson *loc. cit.*, gen. 32 = *Vespertilio* Linnæus).
  23. = *Vespertilio auritus* Linnæus (*loc. cit.*, gen. 4, sp. 6).
  24. = *Vespertilio murinus* Linnæus (*loc. cit.*, gen. 4, sp. 7). Tautonomic type of *Vespertilio* Linnæus.
  25. = *Vespertilio pictus* Erxleben (*loc. cit.*, gen. 16, sp. 8). The only citation is "Seba, Thes. vol. I, p. 91, n. 2, 3. tab. 56, fig. 2, 3."
  26. = *Vespertilio perspicillatus* Linnæus (*loc. cit.*, gen. 4, sp. 3).
  27. = *Vespertilio spasma* Linnæus (*loc. cit.*, gen. 4, sp. 4). The only citation is "Seba, Thes. vol. I, p. 90, n. 1, tab. 56, fig. 1."

XVI. *Phoca* Gronow (ex Brisson = *Phoca* Linnæus).
  28. = *Phoca vitulina* Linnæus (*loc. cit.*, gen. 10, sp. 4). Tautonomic type of *Phoca* Linnæus.

XVII. *Canis* Gronow (ex Brisson = *Canis* Linnæus).
  29. = *Canis familiaris* Linnæus (*loc. cit.*, gen. 11, sp. 1). Tautonomic type of *Canis* Linnæus).
  30. = *Canis mexicanus* Erxleben (*loc. cit.*, gen. 45, sp. 3).

The only two species of monkeys recorded are placed in *Cercopithecus* literally as follows:

"CERCOPITHECUS. Brisson. Quadr. gen. 29, stirp. 4."

XVIII. *Lutra* Gronow (ex Brisson, *loc. cit.*, gen. 40).
  31. =*Mustela lutra* Linnæus (*loc. cit.*, gen. 14, sp. 2). Tautonomic type of *Lutra* Haak (ex Brisson), 1762.

XIX. *Talpa* Gronow (ex Brisson =*Talpa* Linnæus).
  32. =*Talpa europæa* Linnæus (*loc. cit.*, gen. 19, sp. 1). Tautonomic type of *Talpa* Linnæus.

XX. *Philander* Gronow (ex Brisson).
  33. =*Didelphis philander* Linnæus (*loc. cit.*, gen. 21, sp. 2). Tautonomic type of the genus *Philander* Haak (ex Brisson), 1762.
  34. =? No citations. Probably not identifiable.
  35. =*Didelphis brevicaudata* Erxleben (*loc. cit.*, gen. 8, sp. 4). Type of *Peramys* Lesson, 1842. Citations: Brisson, gen. 42, sp. 9; Seba, Thes. I, p. 50, tab. 31, fig. 6. Brisson is based on Seba.

XXI. *Balaena* Gronow (ex Brisson and Linnæus).
  139. =*Balaena mysticetus* Linnæus (*loc. cit.*, gen. 37, sp. 1). Tautonomic type of *Balaena* Linnæus.

"20. *Cercopithecus* imberbis, caudatus, niger; labio superiore fisso; auriculis quadratis nudis; pedibus croceis."

". . . Linn. Syst. Nat. Ed. 10, gen. 2, n. 15." [=*Simia midas* Linnæus.] The little black Monkey, Edw. Av. p. 196, tab. 196. Brisson is not quoted, it not being a Brissonian species.

A fuller description follows, making seven lines in double column, followed by "Habitat in America Meridionali."

"21. *Cercopithecus* caudatus, imberbis, ore fusco: cauda nuda subsquamosa."

The first citation is "Brisson. Regn. Animal. n. 13," followed by citations of Seba, Petiver, Klein, and "Linn. Syst. Nat. Ed. 9, gen. 2, n. 6," and "Linn. Syst. Nat. Ed. 10, gen. 2, n. 18." The first is *Simia faunus* Linnæus, the second, *S. morta* Linnæus, neither identifiable. This is followed by a description of twelve lines in double column, and "Inhabitat America Meridionalem."

As the above two species of monkey are the only species enumerated by Gronow, it was natural that he should place them in accordance with Brisson's system and nomenclature, which Gronow in all cases so scrupulously followed. If he had also had some African guenons or some macaques in his Museum there is no reason to believe that he would have placed them in any group other than Brisson's *Cercopithecus.* It is obvious therefore that Gronow did not under any reasonable construction determine the genotype of the invalid Brissonian "genus" *Cercopithecus.*

Elliot[1] stated: "For nearly a century and a half the genus *Cercopithecus* has been employed by all mammalogists for the group of African Monkeys known by the popular name of Guenon, and Erxleben, 1777, is usually given as the author of the generic term. On investigating the literature of this name, it would seem we must go farther back into the past than Erxleben . . . to learn that *Cercopithecus* when first employed as a genus had an American monkey for its type, and that no Guenon was included in it." He then refers to Brisson's Stirps IV, and to Gronow's 'Zoophylacium,' where he says, "on page 5 of the *Quadrupeda* he employs Brisson's subgenus *Cercopithecus* as a genus, citing it as 'Stirps IV' of Brisson's work, naming as his first species, the 'little black monkey' of Edwards' 'Natural History,' and giving the number of the colored plate 196. This is a very recognizable figure of the *Simia midas* Linnæus. Therefore, reluctant as we may be to accept the change, the Tamarins, or at least certain species of them, will have to be hereafter included in the genus *Cercopithecus*, which term was borne for so long a period by the Guenons. . . The generic term next in order to substitute for *Cercopithecus*, is *Lasiopyga* Illiger . . . 1811 . . . with *Simia nictitans* Linnæus as its type, and in this genus the Guenons must henceforth be included."

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[1] 1911, Bull. Amer. Mus. Nat. Hist., XXX, December 21, pp. 341-342.

Elliot accordingly used Gronow's *Cercopithecus* in his 'Rev. Primates' (1913, I, pp. 190–193) for *Simia midas* Linnæus and two other allied species, and *Lasiopyga* (*loc. cit.*, II, pp. 275–382) for the guenons. In a footnote (*loc. cit.*, I, p. 190) he makes further comment, to the effect that although Gronow was not a binomialist the 'International Commission on Zoölogical Nomenclature' has ruled (Opinion 20, 1910) that his generic names, when conforming to the provisions of the Code, are available in nomenclature. This decision had special reference to Gronow's new genera of fishes, of which twenty-six were accepted as valid and six others were considered as synonyms of Linnean genera of 1758. These were all accompanied with adequate diagnoses, as were also his numerous new genera of amphibians, reptiles and invertebrates, and the genotypes were in many cases automatically determinable by either tautonomy or monotypy. *Cercopithecus* was adopted from Brisson; no diagnosis of it was given, and only one of the two species referred to it is identifiable. *Cercopithecus* might thus be construed as valid and date from Gronow. In view of his general procedure in the part of his work relating to mammals it is evident that this would be merely the result of coincidence, his only identifiable species happening to be South American instead of African, and thus transferred *Cercopithecus* from the guenons to a species of tamarin. Of Gronow's twenty-one genera of mammals, twelve had only a single species each, and eight of these were Linnean. On the basis that *Cercopithecus* was validated by its having a single identifiable species referred to it, his inclusion of only one species in each of the eight Linnean genera would render the single species referred to each its genotype by monotypy. It fortunately happens that the genotype of each of the fourteen Linnean genera adopted by Gronow (most of them indirectly through citation of Brisson) is determinable by tautonomy, thus eliminating Gronow as the determinator of their genotypes, as might not have been the case, at least in some instances,[1] if Gronow had chanced to have other species in place of those he recorded. The bearing of these facts indicates the wholly fortuitous opportunity afforded later revisers of nomenclature to transfer *Cercopithecus* from its century and a half of service as the generic designation of nearly a hundred or more species and subspecies of guenons to a very small group of South American monkeys, that had been known equally as long by some other generic name than *Cercopithecus*. This change also results in the substitution of a new family name in place of the long familiar name Cercopithecidæ. Hence if there was ever need to invoke the plenary power of the International Zoölogical Nomenclature Commission to prevent a change in names when such a change "would clearly result in greater confusion than uniformity," the case of *Cercopithecus* is a preëminent instance.

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[1] In the case of *Cervus*, Gronow's single species is *Cervus bezoarticus* Linnæus, the type of *Blastocerus* Wagner, 1844.

Cercopithecus of Erxleben (1777, 'Syst. Reg. Anim.,' p. 22) embraced only Old World monkeys, of which ten of the twenty-two originally included species were guenons, while two other genera were provided for the New World monkeys, all clearly defined by diagnoses giving distinctive characters. Stirps IV (*Cercopithecus*) of Brisson, 1756, and section three of Linnæus' *Simia* (Cauda elongata: *Cercopitheci*, 1758) were separated by Erxleben as three natural groups designated as genera (*Cercopithecus, Callithrix, Cebus*). They each comprised several groups to which later taxonomers assigned generic value, but in the later subdivision of Erxleben's three genera the names of all were conserved for a part of their original content until 1911, when the name of the major group (*Cercopithecus*) was given an entirely different significance, both geographically and taxonomically, from its original import on a clearly fortuitous technicality, involving a change in the generic designation of more than a hundred currently recognized forms (species and subspecies) without any compensating gain for this wholesale confusion in nomenclature. This transposition of *Cercopithecus* has naturally aroused opposition on the part of a number of European mammalogists, resulting in an appeal to the International Commission on Zoölogical Nomenclature to suspend, in this case, the Rule of Priority which renders the transposition of *Cercopithecus* from a large African group of monkeys to a small American group seemingly mandatory. Since no decision of the case, however, has yet been announced by the Commission and as Elliot in his great work on primates has introduced the correct use of these generic names, and all necessary changes connected therewith, I prefer to follow him, using *Lasiopyga* Illiger as the only available generic name for the African guenons.

LASIOPYGA Illiger

Lasiopyga brazzæ[1] **uelensis** (Lönnberg)

Plates XCI, XCII

Lasiopyga neglecta ELLIOT, 1913, 'Rev. Primates,' II, (1912), p. 376, part; only the immature specimen "from the Welle River, procured by the Alexander and Gosling Expedition."

Cercopithecus neglectus (not of Schlegel) THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 466. Poko, 1 specimen (No. 1168, Christy Coll.), which later (1919) became virtually the type of *Cercopithecus brazzæ uelensis* Lönnberg.

Cercopithecus brazzæ uelensis Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 130 (postscript, in text). Type, the Christy specimen from Poko, Belgian Congo; other specimens mentioned from Bafuka and Zobia. The type is here first designated, Lönnberg omitting to do so.

Represented by 40 specimens accompanied by 2 skeletons, collected as follows:

Bafuka, 6 (5 adult ♂, 1 adult ♀), March 12–April 1, 1913.

Faradje, 2, March 9 and 24, 1911.

Niangara, 12 (5 immature), November 25–December 10, 1910; April 6–June 10, 1913.

Poko, 1 (adult ♂), August 23, 1913.

Niapu, 8 (mostly adult ♂), November 25–December 10, April 6–June 10, 1913.

Avakubi, 4 (all adult), January 4–February 24, 1914.

Banalia, 1 (adult ♂), September 21, 1914.

Ukaturaka, 6 (flat native-made skins, without skulls), May–June, 1909.

The external measurements—average (minimum-maximum)—of twenty-one adults of *Lasiopyga brazzæ uelensis*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
13 ♂	1235(1135–1395)	540(465–590)	702(630–850)	157(146–172)	39(33–43)
8 ♀	1029(950–1070)	435(400–470)	587(545–630)	134(123–145)	38(35–42)

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[1] Some of the more important references to *Lasiopyga brazzæ* are the following:

Cercopithecus brazzæ Rivière, 1886, Rev. Sci., (3) XII, 3 Juillet, p. 15. Brief mention of the type specimen in the Paris Museum, from French Congo, without definite locality. Name attributed to A. Milne-Edwards, doubtless a manuscript name on a Museum label.

Cercopithecus brazzæ Sclater, 1893, Proc. Zool. Soc. London, p. 255, text fig. (head); idem, p. 443, Pl. xxxiii (animal, poorly colored). Described fully on p. 443, from two specimens; from "French Congo-land," without definite locality. The stuffed head described and figured on p. 255 was received from A. Milne-Edwards, as was one of the later described and figured skins. In the colored figure the femoral white band is omitted and the coloring in other respects is inaccurate.

Cercopithecus brazzæ Pousargues, 1896, Ann. Sci. Nat. Zool., Paris, (8) III, pp. 216–222. Congo français: 3 adult males, without definite locality, collected by de Brazza; a semi-adult female from Poste des Ouaddas, Haut Oubangui, Lat. N. 5°, Long. E. 16° 47′ 30″. A detailed description based on this material. Calls attention to errors in Sclater's short description and in his colored plate.

Cercopithecus neglectus subsp. *brazziformis* Pocock, 1907, Proc. Zool. Soc. London, p. 687. Based on an immature menagerie specimen from an unknown locality. = *C. brazzæ* Rivière.

Cercopithecus neglectus subsp. *neglectus* Pocock, 1907, idem, p. 687, part. To replace "*C. brazzæ* Milne-Edwards"; includes *C. neglectus* Schlegel.

Lasiopyga brazzæ Elliot, 1913, 'Rev. Primates,' II, (1912), pp. 378–380, Pl. viii (animal, reproduced from Sclater).

The cranial measurements—average (minimum-maximum)—of twenty-one adults of *Lasiopyga brazzæ uelensis* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
13 ♂	112.6(104.5–119.0)	91.7(84.2–97.0)	94.4(87.7–98.0)
8 ♀	100.1(95.7–102.8)	74.9(72.0–80.5)	86.8(75.5–90.3)

	Zygomatic Breadth	Orbital Breadth	Postorb. Constr.	Mastoid Breadth
13 ♂	74.2(67.5-78.5)	61.6(53.6-65.4)	44.3(42.1-46.0)	62.5(58.0-66.3)
8 ♀	65.5(61.0-68.9)	54.3(50.7-57.4)	41.7(37.6-44.0)	57.7(54.2-60.0)

	Length Nasals	Upper Toothrow	Upper Molars
13 ♂	22.6(20.5-25.5)	37.5(35.2-39.7)	19.2(18.1-20.2)
8 ♀	19.5(17.0-22.8)	31.9(30.5-34.0)	17.9(17.0-19.4)

IMMATURE PELAGE.—Immature stages of pelage are represented by seven specimens, all but two from Niangara and all collected in April and June. The youngest (No. 51025, ♂) was taken June 10, and is in the first pelage (Pl. XCI, fig. 2). (Total length, 520 mm.; greatest length of skull, 68; milk dentition only, the last milk molar not fully up.) Brow-band golden yellow, the hairs black at base, the black showing plainly on the front margin of the band. Upper arm, outside of hind limbs and the tail pale yellow, the latter darker at extreme base above and also apically. A pale thinly haired area on the nape. Rest of the upperparts, including the head, yellowish superficially, the hairs individually whitish at extreme base, broadly zoned subapically with dusky, with conspicuous yellowish tips. Cheeks and outside of fore limbs like the back, the latter passing into black on the wrists. Outer border of fore limbs pale yellow, inner surface yellowish white with a silvery sheen; inside of hind limbs similar except that at the thighs it is darkened with a gray suffusion. Underparts thinly haired and yellowish, the hairs of the pectoral area slightly darkened with blackish tips.

The next in age (No. 52437, ♂) is much older and shows no trace of the natal coat. (Total length, 625 mm.; greatest length of skull, 74; milk dentition fully developed but incisors not worn.) The brow-band is not strongly differentiated from the adjoining pelage, except medially, where the hairs are rigid, dull reddish, with lighter tips. Hair and entire dorsal area grizzled as in adults, but the light annulations are much darker, giving a quite different general effect. Tail at base dark chestnut, passing into yellowish brown and darkening apically to blackish. Rump on each side at base of tail chestnut. Fore limbs externally yellowish gray, darker on the shoulder and wrist; internally pale yellowish. Hind limbs similar internally but the hair on the thighs long, soft and blackish on the posterior border. Throat and foreneck whitish, the hair long and soft; rest of ventral surface similar but the tips of the hairs brownish.

Three other specimens represent the same stage as the last; they are all quite similar in general coloration but differ in details, as in the color of the tail and in the amount of chestnut on the back and head. No. 52430 has the front and sides of the head, sides of the nape and the lower back strongly suffused with chestnut, and the light annulations of the entire upperparts have a distinctly rufous tone, increasing in intensity from the nape posteriorly, the whole sacral area as well as the base of the tail being dark chestnut. The tail is less yellow and more grizzled with black, becoming quite black for the apical 50 mm.

A more advanced stage is represented by No. 52427, which has the first permanent molar fully developed in addition to the complete milk dentition. The brow-band is not well defined and is much varied with black; the hairs on the front of the head are broadly tipped with pale tawny; crown and occipital region like the rest of the dorsal surface, the light annulations being light tawny to the base of the tail which is dusky strongly varied with chestnut; remainder of the tail grizzled pale tawny and blackish to near the tip, which is black. Outside of fore limbs a little darker than the back, the black spot on the hand extending to the wrist. Outside of hind limbs grizzled pale tawny and blackish. Inside of all the limbs yellowish white. Throat and foreneck whitish; chest and rest of underparts whitish, the hairs being light basally, the tips dusky. The white bar across the upperpart of the thighs in adults is foreshadowed by an indistinct bar of pale yellow.

No. 52438, a much older specimen, is of special interest. (Total length, 865 mm.; greatest length of skull, 81.7; the milk dentition has all been replaced by the permanent teeth except the canines, and the first two permanent molars are fully developed.) The general color of the upperparts is as in adults except that the light annulations are darker, or slightly more tawny, and the underparts, from the chest posteriorly are less heavily washed with black. Outside of fore limbs blackish from shoulder to base of toes; hind limbs much darker than in the younger specimens but much less dark than in adults. The brow-band is deep rufous, the hairs without the light tips seen in adults, and the broad band of black behind the rufous brow-band, present in adults, is absent, but the area it occupies in adults (extending to the ears) is covered by hairs that are blackish at base and tipped with a narrow bar of rufous. The basal fifth of the tail and the adjoining area at the base is dark chestnut varied with blackish. The white thigh band is represented by buffy yellow. In other words, this specimen strikingly resembles the description and colored figure of the type of *Lasiopyga ezræ* (Pocock), based on a young animal, from an unknown locality.

A young male, probably in the last stage of immature pelage, as the second permanent molar has barely reached the alveolar plane, is peculiar through its exceedingly dark coloration. It has all the distinctive markings of adult age but the black annulations of the pelage are so broad and the light ones so narrow that black prevails over the entire body, suggesting a melanistic condition. The pelage, however, is finer and softer than in old adults, except on the cheeks, crown, nape and base of the tail where a shorter and coarser new pelage is coming in. This specimen therefore may well be considered as representing a late stage of immature pelage.

Sexual Variation.—The females are about one-fourth smaller than the males. In the present series none of the largest females equal the smallest males, the measurements of the two sexes not overlapping, as is usually the case in other forms of *Lasiopyga* in the present collection.

The only constant sexual variation in color is in the perineal area, which is white in the males and brownish red in the females.

Individual Variation.—The wide range of individual variation in size is as marked in the present species as in other forms described in the present paper, as is sufficiently shown by the statement of measurements given above. In male skulls with the basal suture closed the greatest length of the skull ranges from 109 to 119 mm.; in females, from 98 to 102.

Individual color variation in adults is not striking, being much less in amount than in most of the other forms of guenons represented in the present Congo collection. The light annulations of the pelage of the upperparts vary sufficiently—from nearly pure white to a pale tone of buff—to change noticeably the general effect from nearly pure gray to buffy gray, shown in specimens from each locality in about equal degree, in females as well as males. The black of the ventral area varies in breadth and in intensity, and in the length and tone of the buffy hairtips. The inside of the thighs varies from clear white to pale yellowish white, or pale gold. The white bar across the outside of the thigh varies in breadth and in the purity of the white. In most adults there is a narrow band of tawny extending from the front of the shoulder to the proximal part of the upper arm. It is sometimes a conspicuous marking, but not infrequently is entirely absent. When present it varies in color from pale yellowish to deep tawny. The brow-band is exceedingly variable in both breadth and color, being much broader and heavier in some than others, and varying from light ochraceous rufous to chestnut; the light tips of the hairs also vary much in length and in color, from yellowish white to white. The black band behind the brow-band, running to the ears, varies much in width, being twice as broad in some specimens as in others. The narrow line of black at the front base of the brow-band may be strongly developed or practically absent.

Six imperfect flat skins, lacking the feet and most of the front of the head, obtained at Ukaturaka from the natives, require a special word. They differ in no respect from the large series collected 300 to 400 miles further east at Niapu and Niangara except that the light annulations are more buffy and thus give to most of them a darker and more olivaceous general effect. Possibly better specimens and a larger series might show that they represent a slight local differentiation from typical *uelensis*.

NOMENCLATURE.—Lönnberg in his important paper on the monkeys of the Belgian Congo, published in 1919,[1] recorded fourteen specimens of *L. brazzæ*, of which eight were "from various places in the district of Lake Leopold II," another "from Kasai, and a mounted one from Stanleyville." (The locality of the last is open to question.) Also one from Bafuka, one from Zobia, and one from Poko, the last three from the Uele drainage. In a postscript (*loc. cit.*, p. 130) he named the Uele race *C. brazzæ uelensis* (=*L. brazzæ uelensis*), after receiving a specimen from Poko, which may be here designated as the type of *uelensis*, the author omitting to specify a type. The present large series from the Uele district appears to support the alleged characters of *uelensis*.

The present series also contains an immature specimen which agrees so well with the description and colored figure of Pocock's *Lasiopyga ezræ* (1908, Proc. Zool. Soc. London, p. 158, Pl. x, fig. 2) that it could well have served as the type (see above, p. 382). The type was a young individual in the London Zoölogical Gardens, received from an unknown locality, "probably Upper Congo." Elliot showed keen insight when he referred this supposed species to *L. brazzæ*, as probably representing the young of that species. Elliot says of the type of *ezræ* of which he examined the skin: "The specimen is so young, and its pelage so affected by captivity (the hair on the loins having all been worn away by the rope or chain which held it, and the tail having lost all its hair, except a little at the root), that it makes a most unsatisfactory type for a distinct form, and it is to be regretted that such specimens should ever be selected to be the unique representative of a new species. At present it can only be surmised what the full grown animal would look like, but probably it might be recognizable from *L. brazzæ* by having the head from the red frontal band colored like the back. This is, however, only a surmise, as it is more probable that it will prove to be the young of *L. brazzæ*, as I have supposed is really the fact." Elliot indicates this in his synonymy of *brazzæ*.

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[1] 1919, "Contributions to the Knowledge about the Monkeys of Belgian Congo." Rev. Zool. Africaine, VII, pp. 107–154. *Cercopithecus brazzæ*, pp. 129–130.

The series of immature specimens described above shows that individuals of essentially the same age and from the same locality differ widely in coloration. Doubtless a similar series of immature examples of typical *L. brazzæ* would differ in a similar way, rendering it impossible to determine with certainty whether a young specimen from an unknown locality should be referred to *brazzæ* or to *uelensis*. For this reason it seems better to accept Elliot's previous decision and to consider *ezræ* as a synonym of *Lasiopyga brazzæ brazzæ*. In any case such a specimen is subspecifically undeterminable and it becomes necessary to adopt the later name *uelensis* for the Upper Congo form of *brazzæ*.

Another name, *Cercopithecus neglectus* Schlegel (1876) (=*L. neglecta*), requires consideration in the present connection, it having been applied by some authors to the species currently known as *L. brazzæ*. The history of the name *L. neglecta* is as follows. In 1870 J. E. Gray, in his 'Catalogue of Monkeys, Lemurs, and Fruit-eating Bats in the British Museum' (p. 22), referred a specimen of monkey from the "White Nile" to *Simia leucocampyx* "F. Cuvier." (He may have intended to indicate by it a new species.) Gray gave the following description: "Fur grey brown, minutely grey-grizzled; underside of body black; crown, outside of limbs, and all but base of tail black; front edge of thighs and band across haunches whitish." There was no intimation that the skin was not complete, but Elliot states it had the "Head and feet lacking." In 1876, without having seen the specimen, Schlegel (Mus. Hist. Nat. Pays-Bas, Monographie 40, Primates, p. 69) quotes Gray's description, pointing out how it differs from *leucampyx* Fischer and, judging it to represent a new species, proposed for it the name *Cercopithecus neglectus;* and it was accepted by subsequent authors as a well-founded species. No other specimens agreeing with the type are yet known.

Sclater, some years later, in his list of the species of the genus *Cercopithecus* (1893, Proc. Zool. Soc. London, p. 253) referred to *L. neglecta* as "a very distinct species, founded by Schlegel on a single flat skin in the British Museum from the White Nile, which was wrongly referred to by Gray to *C. leucampyx*." There is, however, no evidence that Schlegel ever saw the actual specimen, as he founded it, as he distinctly states, entirely on Gray's description.

Sclater, later in the same volume (idem, p. 443), in redescribing and refiguring *L. brazzæ* (*loc. cit.*, Pl. XXXIII) thus refers again to *L. neglecta:*

"There can be no doubt that *C. brazzæ* is a close ally of *C. neglectus*, and it is even possible that the two species may be the same." He notes, however, some differences, and refers to the absence of "the front part of the face-skin," which he says "having been cut away, it is impossible to say whether it ever possessed the erect red frontal band of *C. brazzæ*, but there are some indications of the band left on the skin. In other respects the two skins [of *brazzæ* and *neglecta*] are much alike, and had they been from the same locality I should have been inclined to refer them to the same species."

Pocock, fourteen years later, in his 'Monographic Revision of the Monkeys of the Genus *Cercopithecus*' (1907, Proc. Zool Soc. London, pp. 686–688), adopted the name *neglecta* in place of *brazzæ* and gave the range of *neglecta* as "Region of the White Nile and Lake Rudolf to the Congo and Cameroons." He adds: "The examples of this species that I have seen appear to be referable to two distinct kinds, which are regarded [by him] as subspecies," and are diagnosed as "subsp. *brazziformis*" and "subsp. *neglectus*." The former (*brazziformis*) is founded on a single immature specimen from an unknown locality, that had been purchased by the London Zoölogical Society from the Zoölogical Gardens at Antwerp, and recorded by Sclater in 1896 (Proc. Zool. Soc. London, p. 780) as from the French Congo. Pocock, however, believed that "it may have come from Belgian rather than from French territory in W. Africa." "Of what may be regarded as the typical form," he says, "the British Museum possesses the imperfect skin obtained by Petherick on the White Nile and referred by Gray with some insight to *C. leucampyx;* a specimen shot by Donaldson Smith on the Omo River, north of Lake Rudolph; a third from the Charada forest in Kaffa, 6000 ft., procured by Mr. W. N. Macmillan. From these I cannot distinguish subspecifically a series sent home by Mr. G. L. Bates from the Ja River, Cameroons, and taken near the bank of the river at an altitude of 2000 ft." The results of Pocock's revision are: (1) the substitution of the name *neglecta* (1876) for *brazzæ* (1886) and the extension of the range of the supposed *neglecta* from the White Nile east to Abyssinia and west to Cameroon; (2) the redescription of *brazzæ* as *brazziformis*, from an immature specimen from an unknown locality, but probably from the type region of *brazzæ*.

Elliot, in his 'Rev. Primates,' (1913, II, p. 377) described the original type of *neglecta*, adding: "In coloration this type is as different from what is ordinarily considered to be *L. neglecta* as can be conceived. It has none of the gray color about it, and the general tint is more brown than any shade of gray. . . There are examples of so-called *L. neglecta* in the British Museum from the Omo River, the Charada forest and Kaffa, north of Lake Rudolf in the east, to the French Congo, and the Ja River in Cameroon, but none of them agree in color with the type, although they do with each other. Unless a gray *Lasiopyga* is obtained on the White Nile, to prove that the type of *L. neglecta* represents a stage of pelage unknown in so-called *neglecta* from other parts of Africa, it would seem that the only proper way will be, in the future, to restrict the name *neglecta* to this White Nile form, and the name for the gray animal would be *L. brazzæ*, conferred by A. Milne-Edwards upon the gray monkey from the Upper Congo, for it is impossible to recognize that form from a correct description of the type of *L. neglecta*." It is of interest to note that Elliot begins his description of the type of *neglecta* by saying: "Head and feet lacking. A black front band at end of the flat skin, presumably hind portion of head; . . . " He describes the thighs as "seal brown on outer edge, remaining portion speckled buff and tawny ochraceous, with a bright buff band crossing at base of tail . . . " This and some other features suggest an immature stage of the *brazzæ* group.[1]

As shown by the foregoing history of *Lasiopyga neglecta*, this name has not sufficient basis for its satisfactory recognition, and it should be consigned to the list of undeterminable species. In the first place it was based on a brief and inadequate description (not on a type specimen) of a mutilated flat skin supposed to have been "obtained on the White Nile." As it was a native-made skin of the usual type used in traffic by the natives of Africa, it may have been "obtained" by the collector from a point far distant from the place where the animal lived. At all events no other specimen like it has come to the notice of mammalogists, either from the White Nile or elsewhere. The region of the White Nile has been too often traversed by exploring naturalists and collectors since 1870 to render it probable that a monkey of this character should have escaped recognition if really occurring there. In case the original specimen of *neglecta* should prove to belong to some later described species (*e. g.*, *L. brazzæ*) it would not conduce to the stability of nomenclature nor to the advancement of science to displace a later well founded and familiar name by the long indeterminate name *neglecta*, which has from its first inception merited discard.

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[1] In this connection Elliot described a young specimen of *Lasiopyga* in the British Museum, "presumably from the Welle River, procured by the Alexander and Gosling Expedition, which differs in color from all others. . . " From his very detailed description it is easy, in comparison with the American Museum series of immature specimens from the same general region, to recognize it as a late stage of immaturity of *L. brazzæ uelensis*. But what is most interesting and worthy of attention is the paragraph following this description, which runs as follows (*loc. cit.*, p. 378): "It is desirable to obtain adults from this district when the proper specific standing of the animal could be accurately ascertained, but there have been already too many names given to half grown captive specimens, a practice more fruitful in creating confusion than producing valid species, therefore I merely desire to draw attention to this example."

I have stated elsewhere in this paper that nearly half of the proposed species of *Lasiopyga* have been based on immature menagerie specimens, to the great detriment of our present knowledge of this group.

Lasiopyga l'hœsti l'hœsti (Sclater)

Plates XCIII; XCIV, Figure 1

Cercopithecus l'hœsti Sclater, 1898, Proc. Zool. Soc. London, p. 586, Pl. xlviii. "Congoland," without definite locality. Based on a living specimen in the Society's Zoölogical Gardens, received from the Zoölogical Gardens at Antwerp.

Cercopithecus l'hœsti Matschie, 1905, Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 262–264 (in text). Specimen from "bei Tschopo im Gebiet des Uelle" (=Tshopo River near Stanleyville), collected by Weyns, in the Tervueren Museum.

Cercopithecus l'hœsti subsp. *l'hœsti* Pocock, 1907, Proc. Zool. Soc. London, p. 714, Pl. xli, fig. 2 (head). Based on the type, from an unknown locality. Cites "*Loc.* Chepo or Tschepo in Congoland," on the basis of the specimen mentioned by Matschie (*loc. cit.*, 1905).

Lasiopyga [*Allochrocebus*] *l'hœsti* Elliot, 1913, 'Rev. Primates,' II, (1912), p. 297, Pl. iii (from Sclater), Pl. i, fig. 1 (head, from Pocock). Based on the type in the British Museum.

Cercopithecus hœsti [sic] Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 218. Two young females from Mawambi.

Cercopithecus l'hœsti Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 128. Three specimens: Mawambi (Christy, 1); Tshopo north of Stanleyville (Weyns, 1), the specimen previously recorded by Matschie (*loc. cit.*, 1905), "Congo" (1), ("from the Zoölogical Garden of Antwerp").

Represented by twelve specimens accompanied by one skeleton, collected as follows:

Gamangui, 10 (2 ♂—1 adult, 1 young—, and 8 ♀), January 27–February 12, 1910.

Babeyru, 1 (old ♂), July 14, 1914.

Stanleyville, 1 (immature ♀), April 1915.

The external measurements—average (minimum-maximum)—of seven adults of *Lasiopyga l'hœsti l'hœsti*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
2 ♂	(1275–1300)	(575–545)	(700–755)	(172–172)	(–42)
5 ♀	1004(985–1040)	482(460–515)	522(480–550)	135(130–140)	–

The cranial measurements—average (minimum-maximum)—of the same seven adults of *Lasiopyga l'hœsti l'hœsti* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
2 ♂	(106.4-107.0)	(89.5-91.2)	(98.1-99.7)	(74.5-77.8)
5 ♀	96.8(94.0- 98.9)	71.4(68.6-74.5)	82.9(80.2-84.4)	62.9(61.4-65.6)

	Orbital Breadth	Postorb. Constr.	Mastoid Breadth
2 ♂	(60.2-63.0)	(45.1-44.8)	(62.5-64.2)
5 ♀	58.2(52.2-63.7)	42.4(40.9-43.0)	56.3(55.2-57.3)

	Length Nasals	Upper Toothrow	Upper Molars
2 ♂	(21.9-27.5)	(35.8-36.8)	(19.1-19.4)
5 ♀	15.8(13.2-18.8)	32.1(31.5-33.0)	18.4(17.5-19.0)

SEXUAL VARIATION.—The two old males are both much larger than the largest of the females, which has a total length of 1040 mm., while the total length of the two old males is respectively 1275 and 1300 mm. There is, however, no sexual difference in coloration.

A very young specimen (No. 52459, ♂, Gamangui, February 10, 1910; total length 695, greatest length of skull 80) is only slightly distinguishable in pattern and coloration from fully adult specimens. Three other specimens, all of the same age and size as the above, have nearly acquired the adult color pattern but have an appearance of immaturity in the texture and length of the pelage and the absence of slight development of the gray band on the flanks.

The fully adult specimens are very uniform in all features of coloration, individual variation being unusually limited.

Eleven of the twelve specimens of the present series are from practically the same locality, Babeyru being only a day's journey from Gamangui, where ten of them were obtained; the other is from Stanleyville, about 200 miles southwest of Gamangui. So far as I am aware, only six specimens of this species have been previously recorded, of which two (including the type) are without definite locality; of the other four, three (two of them young females) were from Mawambi, about 120 miles southeast of Gamangui, the other from "Tshopo River near Stanleyville," which is the first definite record occurring in the literature.

The only described form with which *Lasiopyga l'hœsti* need be compared is *L. thomasi* (Matschie), based originally on a young female and four imperfect native-made skins from the east shore of Lake Kivu. Lorenz, in 1915, recorded a specimen from the "östliche Randberge der Rutschuru-Ebene" as the type of his *Cercopithecus thomasi rutschuricus*,[1] later (1917) referred by him to *L. thomasi*. Lönnberg (*loc. cit.*, 1919) records two additional specimens, one being from the type locality and the other from Masisi, a short distance northwest of Lake Kivu. The differences claimed as distinguishing *thomasi* from *l'hœsti* are rather slight, indicating at best merely a southwestern local form of the latter. Pocock

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[1] 1915, Anz. Ak. Wiss. Wien, Math. Nat. Kl., No. 14, June, p. 172.

(1907) regarded this as its proper status, on the basis of the original description. Elliot (1913) took exception to this ruling and not only recognized *thomasi* as a distinct species but referred it to a different subgenus, on the basis of his examination of the type specimen ('Rev. Primates,' II, (1912), p. 371). Lönnberg (1919) expressed surprise at this, stating that from his examination of two specimens from the type region of *thomasi* with specimens of *l'hœsti*, that it is impossible for him to understand "why Elliot has regarded *l'hœsti* and. *Thomasi* not only as separate species, but even placed these 'species' in separate subgenera!" He expresses himself as uncertain whether or not they should be kept apart as even geographical races.

Lasiopyga kandti (Matschie)

Cercopithecus kandti MATSCHIE, 1905, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 264. Volcano region north of Lake Kivu. Three imperfect native-made skins without skulls.

Cercopithecus kandti POCOCK, 1907, Proc. Zool. Soc. London, p. 695. "Two flat native-prepared skins" from "near Lake Kivu (*Powell-Cotton*)."

Lasiopyga kandti ELLIOT, 1913, 'Rev. Primates,' II, (1912), p. 371. Based on the type specimens in the Berlin Museum.

Cercopithecus kandti LÖNNBERG, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, p. 36. Kisenji, German East Africa. Two specimens, a male and a female.

Cercopithecus kandti LÖNNBERG, 1919, Rev. Zool. Africaine, VII, p. 135. Five native-made skins from the region of Lake Kivu. *C. insignis* Elliot is referred to *kandti*.

Cercopithecus insignis ELLIOT, 1909, Ann. Mag. Nat. Hist., (8) IV, September, p. 274. "Congo Forest, Central Africa." Described from a living specimen in the Antwerp Zoölogical Gardens.

Lasiopyga insignis ELLIOT, 1913, 'Rev. Primates,' II, (1912), p. 372.

Represented by two mutilated native-made skins, without skulls, and lacking hands and feet and the facial region to above the eyes, from Kisenje, about four miles east of Goma, northeastern bank of Lake Kivu, They are evidently skins of adults, and the pelage is in excellent condition. The first complete specimens, one adult male and one female with skulls, were described by Lönnberg (*loc. cit.*, 1917).

Cercopithecus insignis Elliot was described from a living specimen in the Antwerp Zoölogical Gardens, of which Elliot says: "It was very active and constantly in motion, making a careful description difficult." Lönnberg (*loc. cit.*, p. 135) says: "After its death this specimen [type of *insignis*] has been delivered to the Congo Museum, where it has been registered as No. 3429. This is very fortunate, because thanks to this it is open to any zoologist to verify that *insignis* is nothing but a specimen of *kandti*." Instead of having "the lower back dark orange unspeckled," as described by Elliot, Lönnberg states, "The type specimen of '*insignis*' is, however, just as much speckled as adult specimens of *C. kandti* generally are. As regards the shades of colour exhibited there is no difference between '*insignis*' and *kandti*, nor in pattern, but *kandti* displays a certain amount of individual variation even at the same locality."

Elliot's description appropriately characterizes the exceptionally well furnished fur, as long, loose and fluffy. *L. kandti* evidently inhabits the colder climatic belt in the mountain forests northeast of Lake Kivu and in some respects resembles *L. kolbi* from the forests of Mount Kenya and the Kedong Escarpment of Kenya Colony.

Lasiopyga leucampyx stuhlmanni (Matschie)

Plates XCIV, Figure 2; XCV

Cercopithecus stuhlmanni Matschie, 1893, Sitzungsb. Ges. Naturf. Fr. Berlin, November, pp. 225–227. Forest north of Kinjawanga, west of the Ituri River, between Lakes Albert Edward and Albert, in the country of the Wakondjo (about 0° 25′ N., 29° 35′ E. = neighborhood of Semliki River south of Beni), Belgian Congo. Adult male skin and skull.

Cercopithecus otoleucus Sclater, 1902, Proc. Zool. Soc. London, p. 237, Pl. xxv. Latuka Mountains, North Uganda. Based on a living specimen in the London Zoölogical Society's Gardens. Referred to *C. stuhlmanni* by both Pocock and Elliot.

Cercopithecus leucampyx subsp. *carruthersi* Pocock, 1907, Proc. Zool. Soc. London, October 8, p. 691. "Ruwenzori, east side, 10,000 ft. (D. Carruthers)." Based on a skin without skull.

Cercopithecus princeps Elliot, 1909, Ann. Mag. Nat. Hist., (8) IV, September, p. 304. Mpanga Forest, west and south of Lake Albert. Type, a skin with skull. Sex not stated but evidently an adult male.

Cercopithecus (*Mona*) *leucampyx schubotzi* Matschie, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 78. Mawambi, Belgian Congo. Type an adult male, skin and skull. Also two topotypes and six other paratypes, the latter from nearby localities in the Ituri Forest.

? *Lasiopyga leucampyx sibatoi* Lorenz, 1913, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., L, No. 26, December, p. 439, Mountain forest northwest of Lake Tanganyika (2000 m.); *Cercopithecus l. sibatoi*, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 226, Pl. xiv, fig. 6 (skull), Bamboo forest behind the escarpments on the northwest shore of Lake Tanganyika (2300 m.). Type, an adult male, skin and skull.

Cercopithecus leucampyx schubotzi Lönnberg, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, p. 36. Five specimens, 2 from Rutshuru (adult male and semi-adult female), 3 from Beni (1 adult male and 2 quite young).

Cercopithecus leucampyx schubotzi Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 224. Three specimens, Moëra and Ukaika, Ituri Forest.

Cercopithecus leucampyx princeps Lorenz, 1917, idem, p. 225. A young male from Rutshuru.

Cercopithecus leucampyx carruthersi Lönnberg, 1919, Rev. Zool. Africaine, VII, pp. 130–132. Thirteen specimens, from eight localities, scattered from the Ituri Forest to Rutshuru, including (among others) Mawambi, Kilo, Beni, Masisi, and Rutshuru. *C. princeps* Elliot and *C. l. schubotzi* Matschie are referred to *C. l. carruthersi* Pocock. Extended comment on the color variations shown by this series.

Represented by 68 specimens accompanied by 6 skeletons, collected as follows:

Akenge, 25 (13 ♂, 12 ♀), September 13–October 29, 1913.

Niapu, 11 (6 ♂, 5 ♀, all adult), November 16–December 18, 1913; January 29, 1914.

Medje, 8 (7 ♂, 1 ♀), March 26–September 21, 1910.

Gamangui, 19 (12 ♂, 7 ♀, nearly all adult), January 28–February 19, 1910.

Avakubi, 4 (2 ♂, 2 ♀, all adult), August 1914.

Risimu, 1 (adult ♂), September 7, 1909.

Fifty are fully adult; the others range in age from young a few days old to those with the permanent dentition complete except the last molar. All but four have measurements taken from the animal before skinning. Twenty-five were collected at Akenge, nineteen at Gamangui, the others at points near these two localities.

The external measurements—average (minimum-maximum)—of forty-two adults of *Lasiopyga leucampyx stuhlmanni*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
24 ♂	1489(1325–1620)	532(410–625)	961(820–1090)	165(145–183)	45(42–48)
18 ♀	1286(1130–1540)	464(315–520)	822(687–1020)	142(133–154)	41(35–45)

The cranial measurements—average (minimum-maximum)—of forty-six adults of *Lasiopyga leucampyx stuhlmanni* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
28 ♂	109.7(101.2-117.5)	88.8(77.0-97.5)	92.2(87.3-97.5)	72.5(65.5-78.6)
18 ♀	97.8(93.3-103.2)	76.3(70.5-80.1)	83.3(79.8-88.6)	65.9(61.4-68.5)

	Orbital Breadth	Postorb. Constr.	Mastoid Breadth
28 ♂	59.1(53.0-64.3)	43.5(41.0-46.0)	60.7(53.5-65.5)
18 ♀	53.2(49.8-54.8)	41.2(39.5-44.0)	55.3(52.2-58.2)

	Length Nasals	Upper Toothrow	Upper Molars
28 ♂	20.7(17.2-23.7)	35.0(32.0-37.7)	18.4(16.4-19.9)
18 ♀	17.9(15.5-21.6)	31.1(29.7-32.5)	17.8(16.2-18.3)

Immature Pelage.—The youngest of the series (No. 52400, ♀, Medje, August 29, 1910; total length, 573 mm.; greatest length of skull, 66.2), is entirely in the first coat. The pelage is exceedingly soft and fine, deep black on the entire upperparts (including the forehead, which shows barely a trace of the frontal band), the entire limbs and tail. The underparts are nearly naked except on the foreneck and thorax, which are thinly covered with very soft, fine fur, blackish on the foreneck, dingy grayish brown on the thorax. The milk incisors and first molar are fully up, the tips of the canines are just breaking through. A second specimen (No. 52397, ♂, Medje, July 26, 1910; total length, 580; skull missing) is of the same age and entirely similar in the color and texture of the pelage.

More advanced stages are represented by two specimens from Akenge, both of the same sex and age and closely alike in pelage, taken respectively September 27 and 28. While in general they are larger than the two above described there is only slight difference in the development of the teeth. The smaller one (No. 51029 has a total length of 548 mm. and a skull length of 66.7, as against 610 and 69.5 in the other, No. 51030). The following changes in pelage have been acquired: a broad brow-band and gray cheeks as in adults; a thickening and lengthening of the pelage, the new hairs being minutely white-tipped. These two specimens differ in the younger one (No. 51029) being more scantily haired, and in retaining more of the soft black coat on the body and limbs, which are grayish black in the other.

Another specimen from Akenge (No. 52360, ♀, October 9, 1913; total length, 585; greatest length of skull, 55) is very similar to the two last described except that the tail is conspicuously gray instead of black, owing to its abundance of white-tipped hairs.

An older specimen (No. 51028, ♂, Akenge, September 15, 1913; total length, 690; greatest length of skull 72.3) is similar to the last three above described except that the black hair of the crown is longer and coarser, and the gray hair of the brow-band and whiskers is longer and better developed, and there is a broad blackish band across the breast.

In the next stage, represented by four specimens in which the milk dentition is fully developed, the adult texture and coloration of the pelage is well developed, but shows indications of immaturity. They range in total length from 845 mm. in females to 950 mm. in males, with the greatest length of skull ranging from 68 in females to 77 in males.

Four still older specimens, which have the first permanent molar well developed in addition to the milk teeth, are similar to adults in coloration. They range in total length from 850 to 950 (all males) and from 81 to 85 in greatest length of skull. Such specimens are practically adult in coloration but far below adults in size.

Local Variation.—The series of specimens from different localities, as Akenge, Gamangui, Niapu, of which there is a large number from each, present no differential characters, the same slight individual differences recurring at each.

Sexual Variation.—There is no obvious sexual variation in coloration, but, as usual in guenons, the males greatly exceed the females in size (for measurements see above, p. 392). The largest females however exceed in size the smallest males.

Individual Color Variation.—Individual variation in color is not striking. In certain lights the gray of the upperparts has an olive-gray tone, less noticeable in some specimens than in others. The most marked variation in color is seen in the intensity and posterior extension of the black area of the head and nape. Three specimens from Akenge, all males of the same age (as indicated by cranial characters) and all taken within a few days of each other in October, may be cited as illustrating the range of color variation. No. 52359 has the whole top of the head and nape thickly sprinkled with light-tipped hairs, very few of the hairs being entirely black, with the result that these parts are darkened but by no means black. In No. 52362 the entire top of the head, the nape, interscapular region and shoulders are deep glossy black, the black of the shoulders extending uninterruptedly to the fore limbs none of the hairs being light-tipped. In No. 52352 the top of the head and the occipital area are black enclosing a small coronal spot on which the hairs are minutely light-tipped. The nape is also black but the hairs on the shoulders are mostly light-tipped, but the general effect is much darker than in No. 52359, less dark than in average specimens. Other specimens are intermediate between these two. In the greater part of the series the whole upper surface of the head, the nape, and the shoulders to the arms are uninterruptedly black. Others have the interscapular region more or less gray, gradually merging into the gray of the back. The dark pectoral band is usually correlated in development with the amount of black on the head, nape and shoulders. In some specimens it is broad and deep black; in others narrower and much lightened by the light tips of the hairs. In a few it is scarcely indicated. The ventral area varies from much lighter than the back to about the general tone of the upperparts.

The hair fringing the upper border of the ears varies greatly in amount, being sometimes scanty and sometimes abundant, and in color from pale yellowish white to deep reddish ochre.

About one specimen in ten has reddish hair on the anal area, varying in amount in different specimens from a few hairs only to a conspicuous patch of brownish red.

The light annulations on the hairs of the brow-band vary from clear white to pale buff ringed with black. The light annulations of the cheek hairs also vary from nearly white to pale buff, and also in the relative breadth of the light and dark bars, so that the general effect is much darker in some specimens than in others; in some immature individuals the prevailing tone is decidedly blackish.

Individual Variation in Size.—Individual variation in cranial characters, as in general size and in the proportions of breadth to length in different parts of the skull, is not strongly marked. In the summary of cranial and external measurements given above (p. 392), only specimens with mature dentition have been admitted, except two or three males in which the canines are not fully grown, although the last molars (m^3) are fully developed.

In three old male skulls in which the basal suture is wholly obliterated the greatest length of the skull varies from 108 to 117.5 mm., average 114, percentage of variation (based on the average) 8.4; in eight skulls in which the basal suture is closed but not obliterated the greatest length varies from 105 to 115, average 111, percentage 0.9; in twelve skulls with the basal suture open the range of greatest length is from 104 (canines not fully grown) to 112, average 110, percentage 0.7. In the same skulls the zygomatic breadth ranges from 74.5 to 75.5 in the three oldest, from 71 to 78 in the eight with the basal suture closed, and from 65.5 to 75 in the twelve with the basal suture open.

Individual variation in adult female skulls is similar to that of the males. Three skulls with the basal suture obliterated range in greatest length from 97.7 to 103, averaging 100 mm.; seven skulls in which the basal suture is closed range from 94 to 100, averaging 97.4; six skulls with the basal suture open range from 93 to 103, averaging 97. In the same skulls the zygomatic breadth ranges from 64.5 to 65.7, averaging 65; the seven with the basal suture closed range from 62 to 67, averaging 64.7; the six with the basal suture open range from 61.4 to 66.0, averaging 64.2. The two largest female skulls have the greatest length measurement respectively 103 mm., but in one the basal suture is obliterated, in the other open. The zygomatic breadth is respectively 65.2 and 63.7.

The variation in external measurements of adults is about 15 to 25 per cent of the average, in series of nine to twelve individuals of the same ages as shown by the following synopsis based on flesh measurements of 24 adult males and 18 adult females. The series is divided into three sections, on the basis of age as indicated by the condition of the basal suture: (1) basal suture open, (2) basal suture closed, (3) basal suture obliterated.

Total Length.—Twelve males with the basal suture open vary from 1350 mm. to 1620, average 1484, percentage of variation 18.2; ten males with basal suture closed, 1325 to 1600, average 1498, percentage 18.3; two males with the basal suture obliterated, 1370 to 1580, average 1475, percentage 14.2.

Six females with basal suture open, 1130 to 1335, average 1245, percentage of variation 16.5; nine females with basal suture closed, 1130 to 1540, average 1309, percentage 31.3; three females with basal suture obliterated, 1250 to 1350, average 1292, percentage 7.5.

Head and Body.—Twelve males with basal suture open, 470 to 580, average 528, percentage of variation 20.1. Ten males with basal suture closed, 505 to 625, average 546, percentage 22. Two males with basal suture obliterated, 520 to 565, average 562, percentage 8.1.

Six females with basal suture open, 448 to 490, average 470, variation 8.9. Nine females with basal suture closed, 394 to 620, average 488, percentage 46. Three females with basal suture obliterated, 460 to 485, average 468, percentage 5.4.

Tail Vertebræ.—Twelve males with basal suture open, 850 to 1090, average 948, percentage of variation 25. Ten males with basal suture closed, 820 to 1050, average 957, percentage 24. Two males with basal suture obliterated, 850 to 975, average 913, percentage 13.6.

Six females with basal suture open, 687 to 858, average 771, percentage 22. Nine females with basal suture closed, 715 to 920, average 824, percentage 25.5. Three females with basal suture obliterated, 790 to 865, average 823, percentage 9.0.

Hind Foot.—Twelve males with basal suture open, 150 to 183, average 166, percentage of variation 20. Ten males with basal suture closed, 157 to 174, average 163, percentage 10.5. Two males with basal suture obliterated, 145 to 158, average 153, percentage 7.0.

Six females with basal suture open, 135 to 150, average 141, percentage 10. Nine females with basal suture closed, 133 to 154, average 143, percentage 14. Three females with basal suture obliterated, 135 to 147, average 142, percentage 8.

General Comment.—The above statistics not only show the amount of individual variation in series of specimens of approximately the same age, but tend to show variation with age where the age sections comprise a considerable series of individuals (as from nine to twelve). They show that size is not greatly affected by age, young adults being often among the largest of a series, and undersized examples may be very old.

For greater convenience in comparison the above details are here tabulated

Summary of External Measurements of *Lasiopyga leucampyx stuhlmanni*

Basal Suture Open

	Total Length	Head and Body	Tail Vertebræ	Hind Foot
12♂	1484(1350–1620)	528(470–580)	948(850–1090)	166(150–183)
6♀	1245(1130–1335)	470(448–490)	771(687– 858)	141(135–150)

Basal Suture Closed

	Total Length	Head and Body	Tail Vertebræ	Hind Foot
10♂	1498(1325–1600)	546(505–625)	957(820–1050)	163(157–174)
9♀	1309(1130–1540)	488(394–620)	824(715– 920)	143(133–154)

Basal Suture Obliterated

	Total Length	Head and Body	Tail Vertebræ	Hind Foot
2♂	1475(1370–1580)	562(520–565)	913(850–975)	153(145–158)
3♀	1292(1250–1350)	468(460–485)	823(790–865)	142(135–147)

Nomenclature.—The *Lasiopyga leucampyx* group has a wide geographical range, extending from Angola to Southern Uganda and Lake Rudolf, and is represented by a considerable number of currently recognized regional forms. The present large series of specimens from Northeastern Belgian Congo shows that some of the forms are subject to a considerable amount of purely individual variation, as set forth above, which renders it almost certain that some of the numerous described forms rest on a very unsatisfactory basis. It is thus a question what racial name should be assigned to the present series, for the following reasons:

(1) The described forms have usually been based either on single specimens or on otherwise wholly inadequate material, which has not as yet been materially increased; (2) from the geographical point of view, no specimens have been recorded (so far as present available literature indicates) from the immediate area represented by the present collection. The oldest name involved is *L. stuhlmanni* (Matschie) (1893), based on specimens from the Upper Ituri forest region. To this form specimens from the vicinity of Mawambi, and thence south from various intervening localities to Beni and Rutshuru have been referred by Lönnberg

(*loc. cit.*, 1919) and others, and numerous closely allied forms have been assumed to occur in northern Uganda and southward in British East Africa, some of which are undoubtedly entitled to recognition as races. Yet the alleged differences consist in slight variations in the color of different areas, as the brow-band, the ears, the tone of the upper and under surfaces of the body, the presence or absence of a black breast band, the color of the outside of the thighs in relation to the back, and whether or not red hairs are present at the base of the tail. Most of these differences are represented in the present series of specimens as features of individual variation, perhaps more strongly developed in outside districts so as to become of racial significance. In some of the described forms the general tone of the upperparts appears to be more decidedly olive, or even reddish than in the Congo series.

The seventeen described forms apparently referable to the *leucampyx* group comprise the following. It is of interest in the present connection to give a brief résumé of their history and present status.

1829. *Simia leucampyx* FISCHER. Originally based on F. Cuvier's "La Diane femelle," a menagerie specimen from an unknown locality. Elliot gives a description of an adult skin in the Paris Museum, which "died in the Menagerie in 1899." He gives the type locality of *leucampyx* as "Guinea," without stating proof. Schlegel (1876) referred specimens to it from "Angola et du Congo," and makes *C. pluto* Gray a synonym of *leucampyx*, a decision since commonly accepted by authors, but rejected by Pocock who recognized *pluto* as a subspecies of *leucampyx*, and by Elliot who recognized *pluto* as a distinct Angolan species.

1848. *Cercopithecus pluto* GRAY. Based on a specimen formerly living in the Zoölogical Society's Gardens, London. Type locality, "Angola."

1887. *Cercopithecus boutourlinii* GIGLIOLI. Based on a specimen from Kaffa, South Abyssinia. Other specimens have been since received from Kaffa, Shoa, and other localities in Abyssinia.

1893. *Cercopithecus stuhlmanni* MATSCHIE. Type a skin and skull, from the forest north of Kinjawanga (N. Lat. 0° 25′, E. Long. 29° 35′). Later the author referred to it other specimens from the eastern Ituri Forest.

1900. *Cercopithecus omensis* THOMAS. Based on an immature female from the Omo River, north of Lake Rudolf. Referred by Pocock to *C. boutourlinii*.

1902. *Cercopithecus otoleucus* SCLATER. Type a menagerie specimen from Latuka Mountains, North Uganda, still living in 1907 in the Zoölogical Society's Gardens, London, according to Pocock, who identifies it, as does also Elliot, with *C. stuhlmanni*.

1905. *Cercopithecus neumanni* MATSCHIE. Based on two adult females and an immature specimen from Kwa Kitolo, North Kavirondo. In general characters "almost exactly" like *C. stuhlmanni*, according to Elliot, but upperparts rather more buffy.

1907. *Cercopithecus leucampyx carruthersi* POCOCK. Based on a single specimen from Mt. Ruwenzori, east slope, altitude 10,000 feet. No white in the brow-band, shoulders less black, underparts darker and less speckled with gray than in *stuhlmanni*, now synonymized with *L. l. stuhlmanni*.

1907. *Cercopithecus leucampyx doggetti* Pocock. Based on a single female from southwestern Ankole, between Lakes Victoria and Albert Edward. Middle of back gray toned with greenish and passing into reddish brown posteriorly.

1907. *Cercopithecus leucampyx nigrigenis* Pocock. "The type and only known representative of this subspecies is a single female specimen, ticketed 'W. Africa.'" Distinguished especially by the lateral extension of the black area on the head to the sides of the neck and cheeks.

1909. *Cercopithecus princeps* Elliot. Based on a single specimen from the "Mpanga Forest," southwest of Lake Albert. The description agrees perfectly with the greater part of the specimens obtained by the American Museum Congo Expedition from the Akenge-Niapu district of the Upper Congo region.

1910. *Cercopithecus leucampyx aurora* Thomas. Based on an imperfect skin without skull from the south end of Lake Kivu. Apparently of the *leucampyx* group, and allied to the *stuhlmanni* type.

1913. *Cercopithecus leucampyx schubotzi* Matschie. Type an adult male, skin and skull, from Mawambi. Also several cotypes from Mawambi and neighboring localities. The characters alleged to distinguish this form from *stuhlmanni* and *carruthersi* are merely individualistic.

1913. *Lasiopyga leucampyx sibatoi* Lorenz. Based on an adult female from the Bambu forest at the northwest end of Lake Tanganyika. To be compared with *C. l. aurora* Thomas from the south end of Lake Kivu. Upperparts mixed yellowish brown and black.

1913. *Lasiopyga leucampax* [sic] *maux* Heller. Type and only specimen an adult male "from the summit of the Mau Escarpment between Londiani and Sirgoit, British East Africa." Upperparts grayish olive instead of mouse-gray as in *neumanni* from Kavirondo.

1919. *Cercopithecus leucampyx maesi* Lönnberg. Provisional name for "a young specimen . . . of the *leucampyx*-series from Kutu (district of lake Leopold II)."

1919. *Cercopithecus leucampyx elgonis* Lönnberg. Based on three adult specimens from Elgon (British East Africa?). Compared with specimens of *C. l. carruthersi* from Rutshuru, from which *elgonis* appears to differ only in minor points.

The alleged characters of *L. l. carruthersi* (Pocock) and *L. princeps* (Elliot) are covered by the present series of specimens, the description of *L. princeps* representing an average individual from the Akenge-Niapu district. *L. l. schubotzi* (Matschie) is based on specimens from near the type locality of *L. l. stuhlmanni*. *L. l. carruthersi* has been recorded by Lönnberg from various localities in the eastern Ituri Forest and southward, including the type localities of *schubotzi* Matschie and *sibatoi* Lorenz. Lorenz has recognized in his series of six specimens from the Rutshuru district three forms of the *leucampyx* group, *schubotzi*, *princeps* and *doggetti*. In view of the foregoing facts the name *Lasiopyga leucampyx stuhlmanni* is provisionally adopted for the specimens here under consideration.

Lasiopyga denti (Thomas)

Plates XCVI; XCVII, Figure 1

Cercopithecus denti Thomas, 1907, Proc. Zool. Soc. London, Abstr. No. 38, January 15, p. 1; idem, January 15, p. 2, Pl. i. Ituri River, between Mawambi and Avakubi, Belgian Congo. Adult male, skin and skull.

Cercopithecus denti Pocock, 1907, Proc. Zool. Soc. London, p. 711. Redescription of the type.

Cercopithecus (*Otopithecus*) *denti* Matschie, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), p. 64. Seven specimens, Belgian Congo: Mundema (1), Kulu Kulu (1), Makala (3), Kiapanda (1), Mawambi (1); Powell-Cotton collection.

Cercopithecus (*Otopithecus*) *denti liebrechtsi* Dubois and Matschie, 1912, Rev. Zool. Africaine, I, p. 439, fig. 3. Based on an adult male from Stanley Falls. Considered by Lönnberg (*loc. cit.*, p. 139) "only as an individual aberration of *C. denti.*"

Lasiopyga denti Elliot, 1913, 'Rev. Primates,' II, (1912), p. 351, Pl. xxxvi (skull). Redescription of the type and figs. of the type skull.

Cercopithecus denti Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 220. Four specimens, Belgian Congo: Moëra (2), Ukaika (2).

Cercopithecus denti Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 138. Four specimens, Belgian Congo: Baraka (1), Fundi (2), Mawambi (1).

Represented by 47 specimens, collected as follows:

Poko, 1, August 1913.
Rungu, 1, June 10, 1913.
Akenge, 9, September 5–October 17, 1913.
Niapu, 9. November 13–January 12, 1914.
Medje, 5. August 3, 18, October 9, 1910; June 25, 1914.
Gamangui, 14, January 28–February 20, 1910.
Avakubi 3 September 1, 1913; August 1914.
Batama. 4. September 16–18, 1909.
Risimu, 1, August 30, 1910.

All but eight are adult. Forty are skins with skulls; four are skins with complete skeletons; two skulls without skins.

The external measurements—average (minimum-maximum)—of thirteen adult females of *Lasiopyga denti*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
13 ♀	1078(990–1185)	402(330–460)	676(530–770)	127(120–135)	34(32–37)

The cranial measurements—average (minimum-maximum)—of thirty-five adults of *Lasiopyga denti* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
22 ♂	100.2(90.7-109.2)	78.2(69.4-83.0)	84.0(78.5-90.7)	68.3(59.0-71.5)
13 ♀	89.2(84.0- 94.8)	67.2(63.8-73.0)	78.6(74.2-82.7)	60.1(54.0-63.7)

	Orbital Breadth	Postorb. Constr.	Mastoid Breadth
22 ♂	56.2(50.5-64.0)	43.0(40.6-45.4)	58.5(54.2-62.5)
13 ♀	50.6(48.4-52.5)	42.1(40.8-44.4)	53.2(50.9-55.2)

	Length Nasals	Upper Toothrow	Upper Molars
22 ♂	14.4(12.0-16.4)	30.4(28.5-36.4)	16.3(14.8-20.8)
13 ♀	13.3(11.4-14.8)	26.9(26.0-28.4)	15.3(14.5-16.5)

Immature Pelage.—Two specimens are in the first or natal coat. The pattern of coloration is the same as that of adults, and the color tones are in general so similar to those of adults that there is no mistaking their relationship. The texture of the pelage is of course very different, that of the young specimens being very short and soft, and very thin on the underparts and inside of the limbs. The youngest (No. 52513, ♂, Medje, August 3, 1910; total length, 515 mm.; greatest length of skull, 63.5; only the middle pair of upper incisors and the first milk molar above the alveoli) has a well-developed frontal band of stiff hairs, mixed buffy gray and black, formed by a narrow front border of black followed by a broad band of gray with the tips of the hairs black. Top of head wholly black superficially but the hairs gray at base; nape grayish black; rest of the dorsal area mixed black and pale rufous, the hairs pale gray at base, with a subapical band of rufous and black tips. Underparts and inside of limbs nearly bare except on lower abdomen, the skin golden, with a slight covering of soft white hairs, most developed posteriorly. Entire outside of fore limbs blackish and thinly haired; hind limbs well clothed with long hair, grayish basally and superficially finely grizzled with pale rufous and blackish. Tail pattern as in adults but less strongly colored, the lower surface white faintly toned with yellow on the proximal half.

The other specimen (No. 51026, ♀, Akenge, September 5, 1913; total length, 583 mm.; greatest length of skull, 63.5; milk dentition complete but last molar not fully up) is several weeks older. It is everywhere much more heavily clothed than No. 52513, and in a general way closely resembles adults in both the tones and the pattern of coloration. On the top and sides of the head the first pelage has been replaced by coarse hair of the same texture and color as in adults, but much shorter. The rest of the upperparts are mixed rufous and black, the pelage short and thick. The underparts are still very thinly haired, the hairs soft and white. Outside of the fore limbs is thickly clothed, the fore arms and hands intense black; hind limbs and tail nearly as in adults.

The next stages represented are half-grown young; they differ little from the fully adult except in having a general aspect of immaturity.

The youngest of these is No. 52504, ♂, Gamangui, January 31, 1910 (total length, 690 mm.; greatest length of skull, 82.5; permanent middle incisors and first permanent molars nearly fully developed). The conspicuous white ear tufts of adults are present, and in this particular specimen the rufous speckling prevails over the black. Five others have acquired all the permanent teeth except the last molar, which is nearly up in three and just breaking through the gum in the others. They so closely resemble adults in character of pelage and in coloration as to call for no special comment.

SEXUAL VARIATION.—There is no appreciable difference in color due to sex. The usual sexual variation in size obtains, the males averaging much larger than the females, but some of the largest females exceed the dimensions of the smallest males.

INDIVIDUAL VARIATION.—The usual amount of individual variation in size is present, as shown in the summary of measurements given above (pp. 400–401). As is usual, variation in size is not to any great extent due to age, after maturity is reached, as the following summary of cranial variation in adult males clearly shows. No specimen is included that has not acquired mature dentition, those otherwise mature as regards the teeth, but in which the canines are not fully grown, being excluded from consideration.

The twenty-two males of which cranial measurements are given above consist of ten skulls with the basal suture open, ten in which it is closed, and two in which it is obliterated. The minimum greatest length of the series with the basal suture open is 90.7 mm., the maximum, 109, the average, 99.7. The ten with the basal suture closed have the minimum greatest length of the skull 97.3, the maximum 102, the average 100. The greatest length of skull in the two in which the basal suture is obliterated is respectively 104.4 and 109.2. The zygomatic breadth shows similar conditions, as follows: Basal suture open, minimum 59, maximum 70.8, average 65.6; basal suture closed, minimum 64.6, maximum 70.8, average 68.4; basal suture obliterated, respectively 70 and 71.5.

The series of thirteen fully adult females present parallel conditions.

Individual variation in coloration is much more restricted than is usual in species of guenons. The frontal band varies in width, and from nearly clear white to pale buff, in individuals from the same locality. There is often a mixture of wholly black hairs with the white ones, which are also black-tipped. There is sometimes a narrow line of black at the anterior base of the white frontal band. The cheeks vary from the usual yellowish general tone to occasional examples in which the general tone is dark gray with only a few of the hairs subapically ringed with narrow bands of pale buff.

The light hair tips of the top of the head and the prescapular area vary in color from whitish to buff, and from about an equal area with the black basal tone to a decided predominance of the light tips. The dorsal area varies in tone from strong rufous to blackish. The ventral surface varies from pure white to yellowish white, and exceptionally to pale yellow-orange. The black at the tip of the tail extends from one-fifth to one-third of the total length, with corresponding variation in the median dorsal black band, which varies also from dusky gray to nearly black.

NOMENCLATURE AND DISTRIBUTION.—*Lasiopyga denti* was described by Thomas in 1907, and was based on a single specimen from between Mawambi and Avakubi on the Ituri River. It is represented in the present series by specimens from Batama (near Stanleyville) north to Poko and Rungu, and from various intermediate localities. Lönnberg has recorded a specimen from Baraka, west of the north end of Lake Tanganyika.

Thus far only one subspecies of *L. denti* appears to have been proposed. This is *Cercopithecus* (*Otopithecus*) *denti liebrechtsi* Dubois and Matschie (1912) (=*L. denti liebrechtsi*). It was based on a single specimen from "Stanley Falls" (Stanleyville), or from within the known range of *denti* as represented in the present collection. The description indicates no feature not present in the majority of the present series, some of which are from near the assigned type locality of *liebrechtsi*. Lönnberg (*loc. cit.*, 1919) considers it "only as an individual aberration of *C. denti*." It seems, however, not entitled even to this faint compliment.

A closely allied form has been described by Dubois and Matschie (1912, *loc. cit.*, p. 440) as *Cercopithecus* (*Otopithecus*) *elegans* (=*L. elegans*), the type a specimen in the Tervueren Museum, "wahrscheinlich vom Lomani." Another, immature specimen from the Aruwimi, in the same museum, is a paratype. The description shows it to be closely allied to *L. denti;* the characters claimed for it indicate that it may be only a subspecies of *denti*. Lönnberg (*loc. cit.*, 1919, p. 139), who has examined the two original specimens, gives them as both from Aruwimi, and says it is "easy to recognize on the white cheeks, and on the black dominating more completely in the temporal region, but especially on its gray hind legs." The amount of black on the temporal region is variable in *L. denti*, but the other assigned characters should have value. Lönnberg considers it as substituting "*C. denti* on the western side of the great Lualaba" River, doubtless on account of the alleged type being "apparently" from the Lomani River, although Lönnberg himself gives the type (No. 346) as from the Aruwimi!

Lasiopyga wolfi (Meyer)

Cercopithecus wolfi Meyer, 1891, Notes Leyden Mus., XIII, p. 63. "Central West Africa." Exact locality unknown; described from a living specimen in the Dresden Zoölogical Garden.

Cercopithecus wolfi Meyer, 1894, Proc. Zool. Soc. London, p. 83, Pl. vii (colored).

Cercopithecus wolfi Pocock, 1907, Proc. Zool. Soc. London, p. 711. Records a specimen from Brazzaville, received at the London Zoölogical Gardens.

Lasiopyga wolfi Elliot, 1913, 'Rev. Primates,' II, (1912), p. 351. Records a specimen from Batempas, Sankuru River.

Cercopithecus wolfi Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 136. Nineteen specimens recorded from seven localities in the Lake Leopold II district, and one from Stanleyville with comment on their variations.

Represented by one specimen (No. 52573), an adult male, skin and skull, with field measurements, collected at Mosembe, southwest of Nouvelle Anvers and about 250 miles from the Lake Leopold II district, July 22, 1909. Collectors' measurements: Total length, 1015 mm.; head and body, 283; tail vertebræ, 732; hind foot, 142. Skull, greatest length, 93.6; occipito-nasal length, 82.4; condylobasal length, 73.0; zygomatic breadth, 64.2; length of upper toothrow, 28.2; length of upper molars, 14.8. The permanent dentition is fully developed, but the basal suture is not closed. The pelage is in fine condition.

This species generally has been placed close to *L. denti*. The white brow-band, extending laterally to the ears, and considered by Pocock as one of the most distinctive characteristics, is rather indistinct in the present specimen. The ear-tufts are tinged with ochre; the whiskers appear blackish, heavily grizzled with pale yellow, the base of the hair being light gray. There is a whitish area of silky hair behind the ears joining the white of the throat and underside; the chin is beset with a few bristly black hairs. Upperparts black grizzled on crown with light yellow markings, the speckling gradually turning to brown on the back, where the intensity of the brown increases to form a median darker dorsal area. The yellow-orange on flanks is diffused with the much lighter under side which from chin downward is uniform except for a median orange marking on abdomen joining with the dark brown anal region. Forelimbs black externally, with orange streak from elbow up to lateral orange line; there is only an ochraceous touch on the inside of the wrist. Hind limbs reddish brown on outside, heavily speckled posteriorly with black, especially towards black feet. Tail near base above less speckled than back, turning into dirty blackish gray, the terminal third being black; proximal two-thirds of underside of tail appears gray, base of hairs being much lighter than tips.

This species was based on a living specimen from an unknown locality in "Central West Africa." Pocock states that another specimen was obtained by Hamlyn in Brazzaville, whither it was brought by natives. Elliot records a specimen from Batempas, Sankuru River, Kasai. The species has become definitely known through Dr. Maes' collecting a large series in the Lake Leopold II region. Lönnberg also lists one specimen from Stanley Falls.

Lasiopyga ascanius cirrhorhinus (Matschie)

Plates XCVII, Figure 2; XCVIII

Cercopithecus ascanias (?) SCLATER, 1887, Proc. Zool. Soc. London, p. 502. A living specimen in the Society's Gardens "said to have been brought from Manyuema, on the western shore of Lake Tanganyika." (Not *ascanius* Audebert, 1799.)

Cercopithecus schmidti MATSCHIE, 1892, Zool. Anz., XV, p. 161, part. Manyema.

Cercopithecus schmidti SCLATER, 1893, *loc. cit.*, p. 245, part, Pl. XVI (animal, colored, from a living specimen in the Society's Gardens, 1883–1886, from Manyema). See above, Sclater, 1887.

Cercopithecus schmidti FORBES, 1894, 'Handb. Primates,' II, p. 50, part. From Sclater and Matschie.

Cercopithecus ascanius subsp. *schmidti* POCOCK, 1907, Proc. Zool. Soc. London, p. 720, part. Manyema; Bumba, Upper Congo.

? *Cercopithecus* (*Rhinostictus*) *ascanius omissus* MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), pp. 68–70. ?Manyema, Belgian Congo. Type and only specimen, an immature female.

Cercopithecus (*Rhinostictus*) *ascanius cirrhorhinus* MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), p. 70. Province of Stanley Falls. Six specimens.

Cercopithecus (*Rhinostictus*) *schmidti sassæ* MATSCHIE, 1913, idem, p. 72. Sassa, southeast of Lake Albert Edward. One specimen, adult female, skin and skull.

Cercopithecus (*Rhinostictus*) *schmidti enkamer* MATSCHIE, 1913, idem, p. 73. Type, adult male, skin and skull, from a few miles north of Mawambi; three paratypes from neighboring localities (Pemba, and between Mawambi and Beni, Ituri Forest).

Lasiopyga schmidti ELLIOT, 1913, 'Rev. Primates,' II, (1912), p. 306, Pl. V (colored, from Sclater, 1893), part.

Lasyopyga [sic] *schmidti montana* LORENZ, 1914, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 17, July, p. 356. Wabembe, northwest of Lake Tanganyika. Type, an adult male, skin and skull. Also four topotypes.

Lasyopyga schmidti ituriensis LORENZ, 1914, idem, p. 357. Ituri Forest, near Beni and Mawambi. Four skins mentioned. No type designated. Referred by Lorenz himself in 1917 to *enkamer* Matschie.

Cercopithecus schmidti THOMAS, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 466. Medje, 2 specimens; Poko ("20 or 30 miles north-west of Medje"), 6 specimens. No comment.

Cercopithecus schmidti enkamer LÖNNBERG, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September, pp. 32–35, Pl. VIII (skulls). Rutshuru, 9 specimens; Masisi, 2 specimens; Beni, 1 specimen. Detailed discussion. *Lasyopyga* *schmidti montana*, *L. s. ituriensis* Lorenz, and *C. schmidti sassæ* Matschie are all referred to *Cercopithecus schmidti enkamer* Matschie.

Cercopithecus schmidti enkamer Lorenz, 1917, Ann. Naturhist. Hofmus., Wien, XXXI, p. 227, Pl. xv, fig. 1 (2 views of skull). Here he refers his *C. schmidti ituriensis* to *enkamer*.

Cercopithecus schmidti rutschuricus Lorenz, 1917, idem, p. 228, Pl. xv, fig. 2 (2 views of skull). Type and only specimen, an adult male, skin and skull, from the eastern base of Rutshuru.

Cercopithecus schmidti Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 126. Four specimens, 1 each from Zobia, Buta, Bafuka and Uele.

Cercopithecus schmidti enkamer Lönnberg, 1919, idem, pp. 126–127, part. Specimens: Ituri 1, Kilo 2, Lesse 2, Beni 4, Kasindi 1, Lenda 1, Mawambi 1, Masisi 3, Penghe 1, Rutshuru 1, Barika 1, Alimasi 1, Kalumendo 1, Mambaka 1, Pili-pili 1, between Stanleyville and Bafwaboli 1, Kinzi 1.

Represented by 39 specimens accompanied by 2 skeletons (25 males, 14 females, nearly all adult), collected as follows:

Faradje, 1 (♂ adult), March 15, 1911.

Rungu, 1 (adult ♀), June 10, 1913.

Akenge, 14 (9 adult ♂, 2 adult ♀, 3 young ♀), September 13–October 19, 1913.

Niapu, 2 (adult ♂), November 22, December 13, 1913.

Medje, 4 (2 ♂, 2 ♀), March, August, and September, 1910.

Gamangui, 2 (adult ♂), January 29, February 13, 1910.

Bafwabaka, 1 (adult ♂), January 9, 1910.

Avakubi, 2 (adult ♂), October 12, 1909.

Bafwasende, 1 (adult ♀), September 25, 1909.

Kamunionge, 2 (adult ♂ and ♀), September 21, 1909.

Lubilo, 3 (2 ♂, 1 ♀, all adult), September 20, 1909.

Munye Katoto, 1 (adult ♂), September 10, 1909.

Bafwaboli, 4 (1 adult ♂, 3 ♀), September 11, 1909.

Stanleyville, 1 (adult ♂), August 27, 1909.

The external measurements—average (minimum-maximum)—of thirty-three adults of *Lasiopyga ascanius cirrhorhinus*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
23 ♂	1270(1160-1390)	476(430-630)	795(695-930)	141(130-150)	38(34-43)
10 ♀	1090(1020-1160)	410(380-460)	680(630-755)	125(118-135)	35(32-37)

The cranial measurements—average (minimum-maximum)—of thirty adults of *Lasiopyga ascanius cirrhorhinus* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
23 ♂	96.1(90.0-101.0)	72.6(70.6-81.6)	83.9(78.3-88.3)	62.3(60.4-70.7)
7 ♀	87.1(82.8- 90.8)	66.5(62.1-68.8)	78.2(74.0-88.8)	57.7(53.9-63.3)

	Orbital Breadth	Postorb. Constr.	Mastoid Breadth
23 ♂	55.1(49.6-59.3)	41.5(39.0-44.7)	56.0(52.2-60.0)
7 ♀	50.0(46.8-52.8)	41.1(39.8-42.4)	52.5(49.4-54.9)

	Length Nasals	Upper Toothrow	Upper Molars
23 ♂	15.2(13.0-17.4)	29.7(27.5-35.0)	16.5(14.9-17.2)
7 ♀	13.5(10.2-15.6)	26.5(21.2-29.5)	14.7(10.4-16.9)

Individual Color Variation.—Most of the present series of nearly forty specimens were collected in a small area extending from Akenge south to Bafwaboli (about one hundred and fifty miles) and from Akenge east to Avakubi (about half that distance). Fourteen were from Akenge, nearly all of which were collected during a period of ten days in October, 1913. Two-thirds of the others were taken at localities between Avakubi and Stanleyville, September 10 to 25, 1909. These latter and the Akenge specimens were obtained within an area about one hundred miles square in the months of September and October, and are thus comparable as to season and habitat.

The variability of specimens of the *L. ascanius* ("*schmidti*") group of guenons from the same locality was noted by Lönnberg in 1917 on the basis of twelve specimens from the Rutshuru district, and in 1919 on the basis of twenty-five specimens mostly from the Ituri Forest. Respecting the Rutshuru series he says[1]: "The colour of the specimens of this collection is on the whole essentially alike, although presenting variation." He mentions as among these variations the color of the crown, limbs, tail and ears. The color of the hair on the inside of the ears is said to be white or whitish in some and in others pale reddish ochre, in still others intermediate between these shades. He refers to the color of the tail as "very variable in specimens from Rutshuru." Finally he adds: "It appears therefore difficult to base a subspecies on the characteristic mentioned [the color of the tail] when the variation in colour is so common." As a result of these conditions he is led to consider *L. schmidti montana* and *L. schmidti ituriensis* of Lorenz and *L. schmidti sassæ* (Matschie) as not sufficiently different from *L. schmidti enkamer* (Matschie) to be recognized. Later he found[2] that "Specimens from the Ituri forest and Rutshuru are similar, although in both there is a certain amount of variation." He notes especially that the development of black in the lower cheek-stripe varies much in different specimens.

The large series from Akenge in the present collection, nearly all obtained during a short interval in October, afford a satisfactory basis for the study of individual variation in color. In comparison with the wide range shown by other species of mammals from the same region, especially among some of the carnivores and in the *Colobus* monkeys, the variation in these guenons is small, yet it has evidently been misused as a basis for the recognition of a number of questionable subspecies, which will receive attention later in the present discussion.

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[1] 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, pp. 32–33.
[2] 1919, Rev. Zool. Africaine, VII, p. 127.

The extremes in the general coloration of the upperparts do not differ strikingly, the main feature being the difference in the width and tone of the ochraceous annulations of the individual hairs, which results in a slightly lighter or a darker general effect in different individuals. The white underparts vary inappreciably, except that in some a grayish tipping to the hairs is discernible on close inspection which is not usually present but is sometimes conspicuous on the abdominal area. The head markings and the tail, however, are subject to wide variation.

The top of the head is usually much lighter than the rest of the upperparts, it often forming a contrasting crown-patch, due to the light color of the annulations and the extreme shortness of the black tips of the hairs. It is sharply defined on the front and sides by the black brow-band, which often spreads medially behind the crown-patch from the ears to form a poorly defined blackish area on the occiput and nape. In some specimens black is the prevailing tone of the whole nape region, while in others it is not more prominent as a feature of the coloration than is the black-tipping of the dorsal pelage in general.

The nose-spot varies somewhat in size and outline in different specimens, and in color from clear white to pale yellowish or brownish white. Lang informs me that the yellowish or brownish tints of the short-haired nose-spot are evidently the result of subsequent alteration. All specimens Lang and Chapin saw in the field had white nose-spots. Yet slight differences in color and shape of this nose-spot have been used by describers as an important diagnostic character. The black median area behind it is even more variable, being usually broad basally and extended as a narrow band to meet the black brow-band; in others it is much smaller, and the upward extension is reduced to a mere line or even practically obsolete.

The upper lateral band from the eye to the ear is usually broad and heavy, the hairs long, bristly and intensely black. They also usually meet in front as a conspicuous frontal band, but are often greatly narrowed medially and sometimes reduced to obsolescence.

The lower lateral black band is even more irregular in its extent, being in some specimens more than twice as wide as in others. In some it extends forward as far as the eyes as a narrow line of short black hairs, in others it practically ends at a point below the anterior base of the ears. It is formed in part by the black tips of the cheek-hairs or whiskers.

The whiskers consist of long coarse hairs directed backward, usually dull white but often more or less toned with pale yellow and varied with grayish. Those of the lower border are broadly tipped with black, thus forming the upper edge of the lower cheek-band. The length and fulness of the whiskers varies much in different individuals, and also in the amount of black tipping. In some specimens nearly all the hairs are blackish at the extreme tip, contributing a general grayish tone to the cheeks.

The chin has a thin covering of short, blackish, bristly hairs, usually inconspicuous and frequently absent.

The inside of the ears is thinly clothed with whitish hairs, varying from clear white to dingy grayish white, rarely dull reddish (in two or three specimens only).

The most variable feature is the coloration of the tail, with respect especially to the extent of the proximal gray area of the under surface, the length of the blackish tip, and the tone of the red portion. The gray proximal area varies about 100 per cent in its extent, ranging from 100 to 200 mm., or from about one-eighth to one-fourth of the total length of the tail. A parallel variation exists in respect to the extent of intrusion of the color of the back upon the basal portion of the upper surface of the tail. The blackish tip varies greatly in length, being in some restricted to about 30 to 50 mm., in others extending to 150 mm. or more. The amount of black toning the red of the median dorsal band varies greatly in different specimens; in some it is brilliant red, in others the blackish tone prevails.

Although these color variations are in no way exceptional or even unusual, describers of supposed local forms from single specimens or other inadequate material have often based their new forms on differentiations of just this character.

SEXUAL VARIATION.—There is no recognizable sexual variation in coloration in the present large series. There is however a marked sexual difference in size, the males being about one-sixth larger than the females.

AGE VARIATION.—The youngest specimens in the present series are three from Akenge in which only the milk teeth are present, and two others from Bafwaboli in one of which the first permanent molar is just up; in the other the first two permanent molars are fully developed, the third nearly up, and the middle pair of milk incisors and the milk premolars have been replaced by their permanent successors. Even in the youngest the first pelage has been replaced and the coloration and texture of the pelage is like that of the adults, except in one in which it is finer and softer, due perhaps to the retention of a mixture of the first coat.

INDIVIDUAL VARIATION IN CRANIAL CHARACTERS.—The variation in cranial characters is not especially noteworthy, and follows the usual normal lines. In the largest male the basal suture is still open. Two of the three very old specimens are below average size, the other slightly above. The degree of ossification varies greatly in specimens of corresponding age, so that while some are slender and delicate in all parts of the skull others are heavy and strong. In general, of course, ossification is heaviest in senile specimens, and the teeth, especially the incisors and canines are greatly worn, the incisors appearing as formless stumps. The development of the temporal ridges also varies greatly in males apparently of about the same age, being weak in some skulls and heavy in others.

The greatest length of the skull in 23 males varies from 90 to 101 mm., or nearly 12 per cent of the average. The variation is about the same in the occipitonasal length, and ranges in other measurements from 13 to 28 per cent. Similar ratios obtain in the seven females. As usual the transverse and axial measurements are often discrepant, the longest skulls not having as great a zygomatic breadth as do the shorter skulls; nor is the heaviest dentition always found in the largest skulls.

The following abnormalities may be mentioned. In an adult male skull (No. 52542) m^3 on the left side is peg-like and less than half the normal size. An adult female (No. 52550) lacks m^3 on both sides, and there is no evidence that it was ever present. In the lower jaw the last molar is present on both sides and of normal size and form.

NOMENCLATURE AND DISTRIBUTION.—*Lasiopyga schmidti* (Matschie) (1892) was originally composite, having been based on specimens from several different localities, as follows: "Hab. Manyema, westlich vom Nordende des Tanganjika-Sees (Schmidt); Wald zwischen Mengo und Mjongo in Uganda (Stuhlmann); Wald nahe der Murchison-Bay am Victoria Njansa, Uganda (Stuhlmann)." As the species was named for Dr. Schmidt, Manyema has been given as the type locality by some authors; others choose Mengo, Uganda.[1] Not until twenty years later was *L. schmidti* clearly defined and its type locality definitely indicated when its author divided the original composite *schmidti* into subspecies.[2] In this later paper it is stated that the original diagnosis was based on "Ein ♂ ad. und ein ♀ ad., A. 5564 und 5569 des Berliner Zoologischen Museums hat Stuhlmann bei Mengo in Uganda in der Nähe der Murchison-Bay erlegt." The two specimens were fully described in the original paper, and those from the other localities were referred to the same species. In the latter paper (1913) the original Manyema specimen (a young animal, taken living to the Berlin Zoölogical Garden by Dr. Rochus Schmidt) became the type of the new subspecies *Cercopithecus* (*Rhinostictus*) *ascanius omissus* Matschie. We are further told that this young animal was purchased at Mpapua from a caravan on its way from Manyema eastward by Schmidt while on his journey to meet Emin Pascha and Stanley. Hence the specimen is without definite locality, and belongs to the *ascanius* group, in which *schmidti* should also be included (Cf. Pocock, *loc. cit.*, 1907).

In the same paper Matschie described a third subspecies from the Mpanga forest, at the eastern base of Mount Ruwenzori (near Fort Portal) as *Cercopithecus schmidti mpangæ*, based on specimens collected by Dr. Grauer. Also a fourth as *C. schmidti sassæ*, based on a single specimen collected by Major Powell-Cotton at Sassa, southeast of Lake Albert Edward, and a fifth as *C. schmidti enkamer*, the type being from Chima Kilima, north of Mawambi, with three paratypes from between Beni and Irumu, all collected by Powell-Cotton. Lorenz added (1914 and 1917) from the same general region three other subspecies of *schmidti*, as follows: "*Lasyopyga schmidti montana*," from Wabembe, northwest of Lake Tanganyika; "*Lasyopyga schmidtiituriensis*," the type from Ukaika, and three paratypes from Beni, referred later by Lorenz himself to *L. schmidti enkamer* (Matschie); and *Cercopithecus schmidti rutschuricus* (1917), based on a single specimen from the mountain forests of the eastern escarpments of the Rutshuru Plain; the name *rutschuricus* for a form of *Cercopithecus* (=*Lasiopyga*) is preoccupied by an earlier *Cercopithecus thomasi rutschuricus* by the same author (1915). As shown by Lönnberg (*loc. cit.*, 1917 and 1919), four of these subspecies are founded on insufficient characters, and are all referred by him to Matschie's subspecies *enkamer*, which Lönnberg recognizes as ranging from the Manyema-Wabembe district north to the Ituri Forest region, and thence west to Stanleyville. Lönnberg and Thomas have referred Uele specimens to the Uganda form *L. ascanius schmidti*. On ecological grounds this might seem justified, but Lang informs me that these monkeys are relatively scarce beyond the Rain Forest and wherever they occur they live under environmental conditions much the same as those in their real habitat in the Rain Forest, practically never invading the Savannah proper.

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[1] The distribution of *schmidti* as given by authors is of interest. Sclater (*loc. cit.*, 1893) says: "*Hab.* Int. Eastern Africa; Manyuema, west of Tanganyika (Schmidt); Uganda (Stuhlmann)." He mentions that "a skin of this species has been lately received at the British Museum from Berlin." He also states that the specimen figured in Plate XVI (1893, Proc. Zool. Soc. London) was made from an individual which lived three years in the Society's Gardens, and was "presented by the Rev. W. C. Willoughby in December 1883, [and] was originally obtained in Manyuema."

Forbes (*loc. cit.*, 1894) says: "This species was obtained by the Rev. W. C. Willoughby, in 1883, at Uniamwezi, in Eastern Equatorial Africa, and was said to have been brought thither from the Manyuema country, on the western shore of Lake Tanganyika. . . It has also been obtained in Uganda, further to the north."

Pocock (*loc. cit.*, 1907) made *C. schmidti* a subspecies of *C. ascanius*, and devotes the greater part of his account of it to a comparison of it with *ascanius*. He adds: "In the British Museum there are specimens of this local race from the following localities:—Uganda (*F. J. Jackson*, 99 8. 4.1 ; *Capt. H. J. Nadorhr*, 98. 10. 10.1); Port Alice (*H. H. Johnston*, 1. 8. 9. 16); Manyema (*Becke Coll.*, 93. 1. 1. 1); Bumba, Upper Congo (*Capt. Weyns*, 1.5.4.1)."

Elliot (*loc. cit.*, 1913, from his investigations made prior to 1912) gives a poor copy of Sclater's colored plate and an unsatisfactory description. He says, "*Type locality.* Manyema. Type in Berlin Museum. *Geogr. Distr.* Uganda, Port Alice, Manyema, Bumba, Upper Congo."

Thomas (*loc. cit.*, 1915), records two specimens from Medje and six from Poko, Belgian Congo (Christy Coll.) as "*Cercopithecus schmidti*, Matsch.," without comment.

Lönnberg (*loc. cit.*, 1919) recorded three specimens in the Tervueren Museum, collected by Hutereau in the Uele region, one each from Zobia, Buta ("30 kil. north of Niangara") and Bafuka, and incidentally states that "the type specimens" of *schmidti* "were obtained in Uganda at Mengo;" adding that "the Uganda fauna extends westwards to the forests round Uele river to the north of the great forest of Ituri . . ."

[2] *Cf.* 1913, Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), pp 65–68.

Noteworthy is the fact that Lönnberg (*loc. cit.*, 1919, p. 126) has included in *enkamer* a specimen from "Équateur," which is clearly within the range of *L. a. whitesidei* (Thomas), and also a specimen taken between Bafwaboli and Stanleyville, which falls within the range of *L. a. cirrhorhinus*. In the latter instance I follow Lönnberg as I can see no difference between specimens from Avakubi and Akenge and six taken at Bafwaboli, Bafwasende (on the Lindi) and Stanleyville.

It is evident that there is no valid diagnostic subspecific character to distinguish *enkamer* from *cirrhorhinus* and I consider them as synonyms. *Cirrhorhinus*, however, has several pages priority over *enkamer* and I am compelled to accept *Lasiopyga ascanius cirrhorhinus* as the name for the present series, its range extending from a considerable distance west of the Lower Lomami to Beni and Rutshuru, and including also the Ituri and eastern Uele districts.

Matschie (*loc. cit.*, 1913) in describing *cirrhorhinus* designated as type, an adult male, No. 347 of the Museum at Tervueren, said to come "Aus der Provinz Stanley Falls." In connection with the five co-types the only two other locality references occurring in his original description are: No. 246, "Rivière des Topokès," which refers to the Topoke people living on the left bank of the Lower Lomami; and No. 248, "La Lindi," meaning the Lindi River, which reaches from near Stanleyville to farther south than Makala. It is interesting that Lönnberg (*loc. cit.*, 1919), in his paper on the Primates of the Tervueren Museum, six years later, cites nine specimens, among them the same type and two co-types of Matschie, Nos. 246, 248 and 347. For all of these specimens Lönnberg gives the single locality of "Tshoppo." There is undoubtedly some difficulty in ascertaining the exact origin of these specimens in the Tervueren Museum, but it is certain that Major Weyns, long stationed at Stanleyville, has collected at least some of them near Stanleyville, and probably Lönnberg meant to assign them to the forests along the Tshoppo River, where Lang and Chapin have also taken one specimen. Under these circumstances I believe "Tshoppo River, near Stanleyville" was the locality where the type specimen was obtained.

The specimen recorded from Faradje in the northeastern Uele is of special interest. It was really collected in one of the large forest galleries halfway between Faradje and Aba. Since "Faradje" lies in the midst of the Savannah, some 210 miles northeast of Akenge, one might have expected that this specimen would be at least subspecifically different from those taken in the Rain Forest. Compared with some specimens of our large series it differs by a slightly darker median dorsal area. But there are others in the Rain Forest series which it matches perfectly and still others which have even more intense brownish coloration on the back than the Faradje specimen. By selecting on the other hand the specimen most different among the forest series and supposing that this were the only specimen that happened to be at hand for comparison, one would have an apparently good reason for designating the Faradje specimen as a new subspecies. Too often have single specimens served as sole criterion for such a deplorable procedure.

Lasiopyga ascanius pelorhinus (Matschie)

Cercopithecus (*Rhinostictus*) *ascanius pelorhinus* MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), p. 76. Yambuya, Belgian Congo. Type, and only specimen, an adult female, skin without skull.

Represented by five imperfect native-prepared skins from Ukaturaka, an island in the Middle Congo (Lat. 2° N., Long. 20° 30′ E.). These skins lack the face, hands, feet, and skull. The ears are present in two, and the fore limbs to the hands in one. They are otherwise in good condition, with the tail complete.

The character of the nose-spot cannot of course be determined, but in other respects these specimens closely agree with Matschie's description of *pelorhinus*. His *C. a. kassaicus*, described on an earlier page of the same paper (*loc. cit.*, p. 74), is from the Pogge Falls on the Kasai, and based on two immature specimens; the type, a subadult female, was received alive at the Berlin Zoölogical Garden. The chief differences claimed as distinguishing the two forms are the diagnostically doubtful color of the nose-spot which is said to be maize-yellow in *kassaica* and lemon-yellow in *pelorhinus*, and the greater whiteness of the basal portion of the tail in the latter. The present series of specimens agrees better with *pelorhinus* in the greater amount of white at the base of the underside of the tail, while the type locality of this form is not far from Ukaturaka (about 300 miles to the eastward), the type locality of *kassaica* being about twice this distance directly south.

The present specimens have a black brow-band as in *ascanius* (said by Lönnberg[1] to be practicaly absent in *kassaica*). The color tones of the tail and the extent of the white on its proximal portion are strikingly variable. One has a line of vivid red separating the white of the underside from the dark dorsal median band, mentioned by Lönnberg (*loc. cit.*, p. 123) as present in his *katangæ*.

A striking feature of these specimens is the exact agreement in coloration of every part, except the ears and tail, with specimens of *L. ascanius cirrhorhinus* from the Akenge-Medje-Avakubi-Stanleyville region, even to the tones of color of the whole dorsal area and head.

Lasiopyga cephus (Linnæus)

Plate XCIX

Simia cephus Linnæus, 1758, 'Syst. Nat.,' Ed. 10, I, p. 27. "America" = Guinea. Based on Marcgrave.

Cercopithecus cephus Lönnberg, 1919, Rev. Zool. Africaine, VII, p. 127. Lower Congo: Luali, Mayumbe (Bequaert).

Represented by one specimen, ♂, No. 52569, skin and skull, collected near Zambi, 30 miles from the mouth of the Congo, April 1915. No flesh measurements. Not fully adult, m^3 not through the gum. Skull, occipito-nasal length, 96 mm.; condylobasal length, 73.5; zygomatic breadth, 62.3; orbital breadth, 51.2; postorbital constriction, 42.7; mastoid breadth, 56.7.

The extent of the white nose-markings is well shown in the photographic field study (Pl. XCIX); what appears in the photograph to be a brow-band is merely due to the fact that the bluish slate-gray of the skin on the naked part of the face photographs white. The yellowish whiskers, bordered by black above and below, and the peculiar pale yellowish-tipped ear-tufts are the striking features. The crown is considerably darker than the back, the hairs being gray basally, becoming strongly speckled with black, yellow, and brownish-red, the latter considerably more pronounced on back and invading somewhat the flanks. The chin has a few stiff black hairs; throat and lower neck pale gray turning to light olive-gray brown from breast to abdomen. Tail above near root colored like back passing into a stripe of auburn to the red tip that is slightly speckled with black; proximal third of underside gray, the longer hairs speckled with black, passing into pale red which gains in intensity towards the tip. Hands black; forearms slightly speckled like back, innerside dark gray; thighs outside speckled like back, but paler, passing into slightly grizzled feet.

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[1] 1919, Rev. Zool. Africaine, VII, p. 122.

This species is evidently restricted to the lower Congo on the right bank, extending up through the Gaboon to Spanish Guinea (Benito). Lönnberg also records native-made skins from "région de la Sangha."

Lasiopyga pygerythra griseisticta (Elliot)

Plate LXXXIII, Figure 2; C

Cercopithecus tantalus griseistictus Elliot, 1909, Ann. Mag. Nat. Hist., (8) IV, September, p. 259. "Bambara, Welle River, Monbuttu Country, Central Africa." Type and only specimen, an adult male, skin and skull, procured by Mr. Boyd Alexander.

Lasiopyga tantalus griseisticta Elliot, 1913, 'Rev. Primates,' II, (1912), p. 331. Same as the above, with additions and change of generic name.

Represented by fifteen specimens accompanied by one skeleton, collected as follows:

Yakuluku, 3 (2 adult ♂, 1 ♀), September 28 and November 5, 1911.

Aba, 2 (♂, only 1 adult), December 12, 1911.

Faradje, 8 (only 3 fully adult), February 5–September 12, 1911.

Vankerckhovenville, 2 (adult ♂ and ♀), April 16–17, 1912.

The external measurements—average (minimum-maximum)—of seven adults of *Lasiopyga pygerythra griseisticta*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
4 ♂	1111(1015–1230)	473(440–495)	598(575–615)	145(140–152)	41(40–42)
3 ♀	987(910–1040)	415(385–440)	571(555–600)	129(125–135)	40

Elliot gives the external measurements of the type, a male from Bambara, as based on the skin in the British Museum, as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot
♂	1290	570	720	135

The cranial measurements—average (minimum-maximum)—of five adults of *Lasiopyga pygerythra griseisticta* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
2 ♂	(98.3–111.5)	(77.0–91.8)	(86.8–93.6)
3 ♀	97.9(94.4–100.8)	73.6(73.1–74.2)	83.1(79.4–86.5)

	Zygomatic Breadth	Orbital Breadth	Postorb. Constr.
2 ♂	(65.3–70.0)	(64.3–65.3)	(43.3–44.9)
3 ♀	63.6(61.8–65.3)	56.1(51.6–64.2)	42.6(41.0–45.1)

	Mastoid Breadth	Length Nasals	Upper Toothrow	Upper Molars
2 ♂	(56.7–61.9)	(15.6–18.7)	(33.5–36.2)	(19.5–19.8)
3 ♀	52.6(50.0–55.2)	15.8(14.0–17.3)	31.8(31.6–32.2)	18.6(18.4–19.0)

The cranial measurements of the type, as given by Elliot, are as follows:

	Greatest Length	Occipitonasal Length	Zygomatic Breadth	Postorb. Constr.	Length Nasals
♂	113.2	95.5	77.5	44.7	21.2[1]

SEXUAL VARIATION.—There is no recognizable sexual difference in coloration in the present series, but there is a marked sexual difference in size, the only old male being one-sixth larger in external measurements than females of corresponding age, and one-tenth larger in cranial measurements.

IMMATURE PELAGE.—The first pelage is represented by four specimens, forming a series differing in age. The youngest is fœtal (No. 51014, ♀, Faradje, September 12, 1911; total length, 330 mm.), and the teeth have not cut the gums. The pelage is very short and entirely black, but it covers only the head and mid-dorsal area to the sacral region, the rest of the body, limbs and tail being practically nude. The pelage is most heavily developed on the head, where it is thick but short.

The next in age (No. 52470, ♂, Faradje, March 14, 1911; total length, 455; greatest length of skull, 65) is well clothed in the soft natal coat, the basal two-thirds yellowish white, the apical third black, through which the light basal portion can be seen when the pelage is disarranged. In this specimen the cheek-teeth are covered by the gums, but the tips of the incisors have broken through.

The third specimen (No. 52474, ♂, Faradje, February 5, 1911; total length, 550; greatest length of skull, 68) is slightly older, with fully developed milk dentition. The second coat is coming in on the head, on the front edge of the shoulders and on the fore limbs, but not on the body, hind limbs or tail. The white frontal band is clearly indicated, and the hairs of the front half of the head are broadly banded subapically with ochraceous, forming an ochraceous band behind the frontal zone of white.

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[1] Probably total length, not length at middle, as in the other specimens included in the measurements.

The fourth specimen (No. 52466, ♂, Aba, December 12, 1911; total length, 555; greatest length of skull, 74) is older and shows a slight advance in pelage change, especially on the head, where there is a well defined, rather broad ochraceous band behind the narrow frontal line, a transition feature not shown in adults or even older subadults.

A young male (No. 52477, Yakuluku, September 26, 1911; total length, 980; greatest length of skull, 96; m^3 not yet developed) is the richest colored of the whole series, due probably to a fresh, unfaded coat, the pelage in older specimens collected at the same time and place being much paler.

Individual Variation in Coloration.—In general effect the coloration of the upperparts is a grizzle of pale yellowish gray sprinkled slightly with black, especially on the head and median dorsal area, the limbs and tail distinctly grayer than the body, and the tail more strongly mixed with black. The underparts and inside of the limbs are white faintly toned with yellow. In none is the color of the upperparts appreciably toned with green. However, there is a very slight olivaceous tint all over the back. The white frontal band is always strongly developed, but varies in width in different individuals, being twice broader in some than in others. The tuft of lengthened white hair on either side of the base of the tail is usually a conspicuous feature, but is occasionally greatly reduced. It joins the white of the proximal third or more of the underside of the tail. The anal tufts of red hair vary greatly in both color and quantity, independently of sex. In one of two males they are almost obsolete and pale brownish red; in the other they form a broad conspicuous patch of coarse, bright red hair. Other specimens are variously intermediate between these extremes. In one of the females this area is greatly extended, bright red for the most part, but with the longer hairs of the mid-portion chestnut-red passing into blackish apically. In another it is greatly reduced in extent and in intensity of color.

Nomenclature.—The type of *Lasiopyga tantalus* (Ogilby) (1841, Proc. Zool. Soc. London, p. 33) was from an unknown locality. On the basis of specimens essentially agreeing with it from Nigeria this region has been accepted by subsequent authors as the type region of the species (cf. Pocock, 1907, Proc. Zool. Soc. London, pp. 731–733, text fig. 189). Three subspecies belonging to this group were described prior to 1914. Two of these are undoubtedly closely related to those represented in the northeastern Belgian Congo: (1) *C. tantalus budgetti* Pocock (*loc. cit.*, p. 733) based on a single specimen (skin and skeleton) from "Bathyaba" = Butiaba, on the east shore of Lake Albert; (2) *C. tantalus alexandri* Pocock (1909, Proc. Zool. Soc. London, Abstr. No. 71, May 11, p. 25; idem, December, p. 545) based on a specimen from Lake Chad, brought alive to the London Zoölogical Society's Gardens; (3) *C. tantalus griseistictus* Elliot (*loc. cit.*) from about 200 miles east of Bambara (on the Uele River, between Amadi and Surunga, at about 3° 35′ N., 27° 20′ E.), the type locality of this subspecies. The relationships of these three forms cannot now be definitely determined. The earliest name is *budgetti; alexandri* has six months priority over *griseisticta*. Two others were added by Lorenz[1] in 1914, as *Lasyopyga tantalus beniana* and *L. t. graueri*, the former based on two specimens (an adult male and a young male) from Beni, the other on an adult female from Baraka, west of the north end of Lake Tanganyika. The descriptions of these forms indicate their close similarity to the series from the Uele here referred to *griseisticta*. Probably they are synonyms of *L. pygerythra centralis*, for Lönnberg (*loc. cit.*, 1919) lists specimens from Beni and as far west as Ponthierville as *L. pygerythra centralis*.

From the above it is apparent that heretofore specimens recorded from the Savannah north of the West African Rain Forest, from eastern Uele, were considered to be subspecifically related to the West African species *L. tantalus*. Specimens from the Savannah south and east of the West African Rain Forest have been generally subspecifically referred to the South African *L. pygerythra* as *L. p. centralis* and *L. p. katangensis*. Uganda and East African representatives have also been subspecifically included in *L. pygerythra*. On comparing East African specimens with the material from the Uele I see no reason why the Uele specimens should not be treated as a subspecies of *pygerythra*, and therefore have chosen the name *L. pygerythra griseisticta*.

Allenopithecus[2] Lang

[*Allenopithecus* Lang, 1923, Amer. Mus. Novitates, No. 87, September 12, pp. 1–5, Figs. 1–3 (skull and dentition).

The chief characters of *Allenopithecus*, compared with *Lasiopyga*, are given as: baboon-like habitus due to much shorter, heavier body; more muscular shorter limbs, and short tail, although the short rostrum accounts for a distinctly thickset roundish head. The molars more hypsodont, much broader basally, the outer and inner cusps more drawn together towards their apex, so as to form a very narrow longitudinal valley; the lower molars m_1, m_2 and m_3 having an external cusplet at the base of the groove between the anterior and posterior cusps.—H. L.]

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[1] Anz. Ak. Wiss. Math. Nat. Kl. Wien, LI, No. 17, July 2, pp. 357–358. Redescribed in 1917 (Ann. Naturhist. Hofmus., Wien, XXXI, pp. 221–223) as *Cercopithecus tantalus benianus* and *C. t. graueri*.

[2] The first primate collected by the Congo Expedition of the American Museum was "*Lasiopyga*" *nigroviridis* (Pocock). In preparing his general report on the primates of the Congo collection the late Dr. J. A. Allen accidentally overlooked this specimen, which has since been described.—H. L.

Allenopithecus nigroviridis (Pocock)

Text Figures 1–3

[*Cercopithecus nigroviridis* Pocock, 1907, Proc. Zool. Soc. London, October 8, p. 739, Pl. XLII, fig. 5 (head in profile); idem, 1908, p. 160 (in text), Pl. x, fig. 1 (animal; colored). Based on "the skin of a female specimen that lived in the Society's Gardens from November 29th, 1892 to May 15th, 1894," brought from "Upper Congo."

Lasiopyga (*Chlorocebus*) *nigriviridis* Elliot, 1913, 'Rev. Primates,' II, (1912), p. 348. Redescription of the type.

Represented by a single adult male, skin and skull, collected July 16, 1909 (Amer. Mus. No. 52467). Shot in a low tree near Bolobo, at an island in the Congo River. Several other individuals, barking loudly, escaped by leaping to the ground.

The field measurements are: Total length, 960 mm.; head and body, 460; tail vertebræ, 500; hind foot, 135. The principal cranial measurements are: Greatest length of skull, 111 mm.; occipitonasal length, 95.0; condylobasal length, 85.4; zygomatic breadth, 71.5; orbital breadth, 57.7; postorbital constriction, 39.5; mastoid breadth, 56.0; length of nasals, 24.0; upper toothrow (c-m^3), 35.0; length of upper molar series, 27.6; pm^3, width 5; m^1, width 6.8; m^2, width 7.8, length 6.7; m^3, width 7; lower toothrow (c-m_3), 38.5; length of lower molar series, 31.9; m_1, width 4.8; m_2, width 5.9; m_3, width 5.9. The basal suture is not fully closed, but there is a thin, low sagittal crest, although the teeth are only slightly worn. The facial portion of the skull is strongly sloping.

The type of *nigroviridis* was supposed to come from an unknown locality in the "Upper Congo." Another living specimen which Hamlyn stated "was brought with other Monkeys to Brazzaville from further inland" was received later in London. The present specimen from near Bolobo, about 150 miles north of Brazzaville, gives the first definite locality for the species.

The excellent description by Pocock[1] agrees so well with the color of the present specimen as to leave no doubt as to its correct specific reference. Slight alterations are necessary to make it fit perfectly, since

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[1] His later colored figure of the species (*loc. cit.*, 1908, Pl. x, fig. 1), however, could hardly be more misleading, since green is not the prevailing color, as indicated by this figure.—H. L.

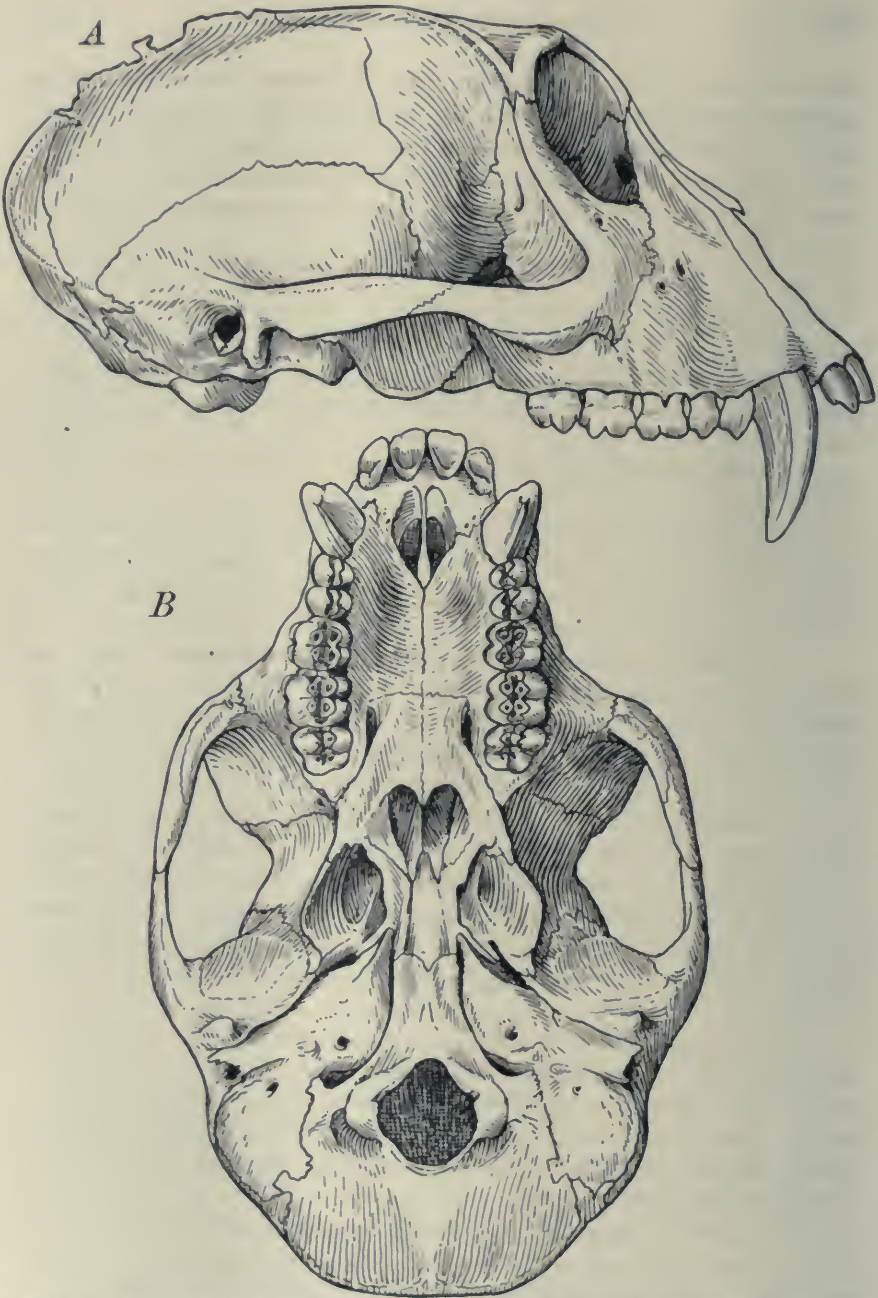

Fig. 1. *Allenopithecus nigroviridis* (Pocock). Skull of adult male (No. 52467).
A, right lateral view; *B*, palatal view. Natural size.

Pocock had only a young specimen "with remarkably soft silky hair," whereas the present specimen is a fully adult male with fairly coarse pelage, softer and thinner only on the underparts.

Skin of face dark grayish brown, as are also the ears; chin whitish pink, beset with grayish stiff hairs. Hairs on upper lip and adjacent to face black. The black brow-band is hardly indicated in the middle but from the eyes to ears increases in width. The ears are only slightly beset with soft hairs. The basally light gray whiskers are tipped with black and speckled with yellow in such fashion as to produce a golden subapical band near their edges. Crown, nape, shoulders, center of back and dorsal side of tail much darker than flanks; all hairs being at base dark gray, otherwise black and ringed with two golden-yellow bands narrower than the black space between them or than the black tip. Forelimbs towards hands gradually more short-haired, externally of

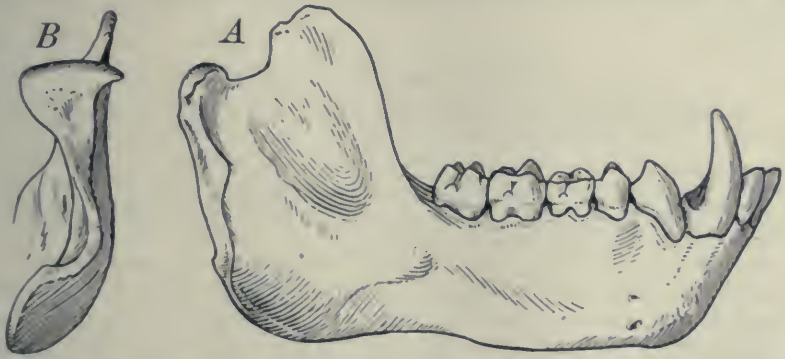

Fig. 2. *Allenopithecus nigroviridis* (Pocock). Mandible of adult male (No. 52467).

A, right lateral view; *B*, posterior view of right ascending ramus, showing wide mandibular condyle, inward curve caused by inception of muscle, and inflected angular process. Natural size.

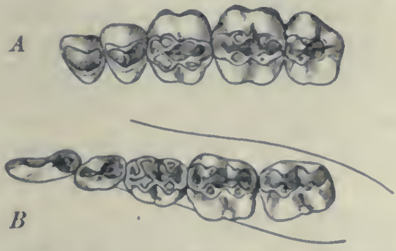

Fig. 3. *Allenopithecus nigroviridis* (Pocock). Dentition of adult male (No. 52467), crown view.

A, left upper molar series; *B*, left lower molar series. $\times\frac{3}{2}$.

much the same speckled appearance as back but paler; hands grizzled; thighs externally more golden than back, passing gradually to the speckled grayish feet. Slightly darker shade across breast. Throat light gray; underparts gray, speckled with black and yellow; portion near flanks bright rusty red; scrotum whitish blue; a tuft of hair at perineal region dark rusty brown. Tail with hair much shorter than on body, darker dorsally, pale yellowish speckled below; extreme tip black.—H. L.]

ERYTHROCEBUS Trouessart

Erythrocebus patas[1] **pyrronotus** (Hemprich and Ehrenberg)

Plate CI

Cercopithecus pyrronotus HEMPRICH AND EHRENBERG, 1829, Verhandl. Ges. Naturf. Fr. Berlin, I, p. 407, Kordofan; *Cercopithecus pyrrhonotus*, idem, 1832, 'Symb. Physicæ,' Mamm., Decas I, Pl. x and text.

Cercopithecus pyrrhonotus SCLATER, 1893, Proc. Zool. Soc. London, p. 250.

Cercopithecus pyrrhonotus ANDERSON, 1902, 'Zool. Egypt,' Mamm., pp. 22–27. Redescription of the type in the Berlin Museum; historical comment.

Cercopithecus pyrrhonotus DE WINTON, 1902, in Anderson's 'Zool. Egypt,' Mamm., p. 25. "Some examples attributed to the Nile region have black noses."

Cercopithecus pyrronotus MATSCHIE, 1905, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 269. Critical comment.

Cercopithecus patas subsp. *pyrrhonotus* POCOCK, 1907, Proc. Zool. Soc. London, p. 744. "I also suspect that the nose of the white-nosed eastern form of this species, for which the oldest name appears to be *pyrrhonotus*, is black in the young."

Cercopithecus (*Erythrocebus*) *patas albosignatus* MATSCHIE, 1912, Rev. Zool. Africaine, I, March, p. 433. "Mbomu-Fluss im Uelle-Becken." Type and only specimen an adult female.

Cercopithecus (*Erythrocebus*) *patas poliomystax* MATSCHIE, 1912, idem, p. 434. "Oberer-Kongo. Genauer Fundort nicht zu ermitteln." Type and only specimen an adult male.

Erythrocebus pyrrhonotus ELLIOT, 1913, 'Rev. Primates,' III, (1912), p. 9.

Erythrocebus pyrrhonotus G. M. ALLEN, 1914, Bull. Mus. Comp. Zool., LVIII, July, p. 354. Seen near Gozar, on the Blue Nile.

Erythrocebus phyrrhonotus WETTSTEIN, 1917, Denks. Ak. Wiss. Wien, Math.-Nat. Kl., XCIV, p. 646. J. Debri, S.-Kordofan (about 30 miles north of Kadugli), skin and skull of a young female.

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[1] The basis of *Simia patas* and its synonyms is as follows:

Le Patas Buffon and Daubenton, 1766, 'Hist. Nat.,' XIV, pp. 208–223, Pls. XXV and XXVI (animal), XXVII and XXVIII (anatomy). "Sénégal," by inference. ("Nom de cette espèce . . dans son pays natal au Sénégal.") Two specimens are figured and described as, respectively, *Patas à bandeau noir* (Pl. XXV) and *Patas à bandeau blanc* (Pl. XXVI) but they are said to differ only in the color of the supraorbital band, which is black in the former and white in the latter.

Simia patas Schreber, 1775, 'Säugthiere,' I, p. 98, Pl. XVI. No technical name in the text but the plate is legended "*Simia patas* Buff." Description based on Buffon and Daubenton, plate a copy of theirs, as above, colored.

Simia rubra Gmelin, 1788, 'Syst. Nat.,' I, p. 34. "*Simia patas* Buffon" of Schreber, renamed *Cercopithecus ruber* of later authors. Also *Simia rubra* Schreber, Pl. XVI B, 1804, without text.

Simia Cercopithecus ruber nigro-fasciatus Kerr, 1792, 'Anim. Kingd.,' p. 71, No. 48. = *Patas à bandeau noir* Buffon.

Simia Cercopithecus ruber albo-fasciatus Kerr, 1792, idem, No. 49. = *Patas à bandeau blanc* Buffon.

Represented by five specimens, all immature but one, which is accompanied by the skeleton, collected as follows:

Faradje, 4 (an adult ♂ and 3 immature), March 8–May 3, 1911.

Niangara, 1 (young ♀), May 4, 1913.

Immature Pelage.—The youngest specimen is a male from Faradje (No. 52575, March 9, 1911) in first pelage (total length 495 mm., greatest length of skull 69.3), with the last milk molar still enclosed in the gum. The pelage of the upperparts is thick and soft, of the underparts thin and silky, not wholly concealing the skin. The nose is black with a cream-buff spot on each side. A narrow frontal band of rigid black hairs, behind which is a broader one of ochraceous buff, paler on the posterior border; cheeks faintly yellowish grizzled with black; head washed with tawny, the individual hairs dark slate-gray (slightly lighter at extreme base) annulated subapically with tawny and slightly tipped with black; nape and shoulders similar superficially but the basal half of the fur is creamy white passing into light gray; the rest of the upperparts similar but the tawny tips of the hairs are longer. The tail proximally is deep cinnamon-buff, becoming gradually paler apically. Ventral area and inside of limbs whitish to the base of the hairs; outside of limbs tawny; hands and feet blackish.

A more advanced stage is represented by two specimens in which the first coat has been replaced by the coarser pelage of a later stage. The younger of the two (No. 52577, ♂, Faradje, May 3, 1909; total length, 650 mm.; greatest length of skull, 90; only the fully developed milk dentition) has the general coloration of adults, the markings being the same except on the nose, shoulders and limbs. The nose is black. The whiskers are softer and less grizzled with black, those at the base of the ears curved upward. The ears are strongly tufted with white hairs, the longest of which have a length of 25 to 30 mm. The top of the head is dark red, with many of the hairs minutely tipped with black, especially those of the occipital area where the black tips have a length of 3 to 5 mm. The pelage of the upperparts is pale reddish, the red extending to the base of the hairs, but with faintly lighter tips mixed with a sprinkling of black tips, the latter long and conspicuous over the scapular area. Outside of the limbs slightly paler than the body, not white as in the mature pelage, and the hands and feet slightly darkened with blackish. The underparts are faintly grayish white slightly toned with reddish on the breast and lower abdomen.

No. 52574 (♀, Faradje, March 8, 1911; total length, 600 mm.; greatest length of skull, 99 mm.; milk dentition fully developed) is slightly older, although smaller and taken two months earlier in the season. The cheeks are strongly mixed with black (black prevailing anteriorly), and the soft buffy hairs at the base of the ears have disappeared and the tips of the ears are much more thinly tufted. The general coloration is nearly as in the young male last described but the front border of the shoulders is strongly toned with gray, which extends to the base of the hairs, and the red color of the back is stronger, with less soft underfur. In fact the general texture of the pelage indicates an older stage of development. The nose is still black.

A somewhat older specimen from Niangara (No. 52578, ♀, May 4, 1913; total length 780 mm., greatest length of skull 93.6; first permanent molar fully up in addition to the milk teeth) is similar to the two examples just described, but the color tones are slightly brighter and the interscapular region is much grayer. The inside of the limbs is much clearer white, while the red tone of the outside of the limbs is more restricted and paler and the gray of the shoulders extends along the outer edge of the forelimbs nearly to the feet. The nose is still black.

ADULT PELAGE.—The adult stage is represented by a single male from Faradje (No. 52576, April 4, 1911; Pl. CI). The nose is conspicuously clear white, in contrast with the intense black nose of the four young already described. The coarse long gray hair of the shoulders is gray to the base of the pelage and extends over the upper arms to the elbow, the whole forearm being white to the end of the toes; a faint creamy suffusion on the anterior aspect contrasts slightly with the clear white of the posterior. The longest of the gray hairs on the shoulders have a length of 90 to 100 mm. The entire top of the head is dark red, darkest on the posterior part where many of the hairs are minutely tipped with black; laterally the black hair tips are longer and form a thin black line joining the broad black facial band. The long cheek-hairs (whiskers) curve upward at the posterior base of the ears. The center of the back is deep brick-red, the hairs being vermiculated with yellow and tipped with black; the sides are lighter. The proximal half of the tail is deep brownish red, much darker than the thighs and lower back. The red on the thighs extends only to a line continuous with the lower border of the callosities.

The external measurements of this specimen are: Total length, 1195 mm.; head and body, 575; tail vertebræ, 620; hind foot, 165; ear, 49. For cranial measurements see p. 431.

RELATIONSHIPS AND NOMENCLATURE.—The *Erythrocebus* group of guenons is a homogenous group, sharply defined from all others by coloration. As a rule the forms are poorly represented in museums, although living specimens in menageries are not unusual. It is from this source that most of the museum specimens have been derived; and the types of the greater part of the described forms have been of this character, usually without definitely known localities.

The distribution of the group extends across Africa south of the Sahara from Senegal to western Abyssinia, thence south to Cameroon, northern Belgian Congo, Uganda, and the western part of British East Africa to Masailand, thus ranging from about 15° N. to 4° S. None have been recorded from Belgian Congo south of the Uele River.

Twelve species were recognized by Elliot, all described prior to 1912, and two forms have been added since that date. Besides these twelve names, several synonyms are commonly referred to *patas* and *pyrronotus*. In recent years several authors have recognized *Erythrocebus* as a genus, others have given it the status of a subgenus. Probably Pocock's estimate of its value is a fair one. He says:[1] "One group [of the guenons], however, stands out from the rest and might perhaps with advantage be given full generic status. This is the group name *Erythrocebus*, typified by *patas*. The living animals differ markedly from other species, not only in colour, but in form. They are slender Monkeys standing high on the legs, the fore legs being particularly long as compared with those of other species, which are heavily built and low on the fore legs. . . . I suspect that *C. patas* is more terrestrial and less arboreal than the other members of the genus *Cercopithecus*."

The number of species referred to *Erythrocebus* by different authors during the last twenty years has greatly varied. Trouessart, in 1904 ('Cat. Mamm.,' Suppl., fasc. 1, p. 13), recognized two. Matschie, in 1905 (*loc. cit.*), admitted five previously described and added four new ones, making nine in all. Pocock, in 1907 (*loc. cit.*), recognized only one, with an additional subspecies (*Erythrocebus patas patas* and *E. patas pyrronotus*). He states that his material was too scanty for him "to contribute anything to our knowledge of the geographical races of the species." He appended, however, a list of references to the described "local forms." Elliot, in 1912 (date of publication June 1913), recognized twelve forms, all as full species. They include those given by Matschie and two others described by himself in 1909. Two others were added by Matschie in 1912.

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[1] 1907, Proc. Zool. Soc. London, p. 679.

These fourteen forms, with their type localities and the character of the material on which they were originally founded, are:

1775. *Simia patas* SCHREBER (ex Buffon and Daubenton). (*Loc. cit.*, p. 98.) Founded on two menagerie specimens, without definite locality but inferentially from Senegal. Buffon's account of these two specimens became later (*supra*, p. 422, footnote) the basis of two specific and two subspecific designations.

1829. *Cercopithecus pyrronotus* HEMPRICH AND EHRENBERG. (*Loc. cit.*, p. 407.) Type, a male brought alive from Kordofan to Berlin, where the prepared specimen is preserved in the Zoölogical Museum. (Cf. Matschie, 1905, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 269.) Redescribed by Anderson in his 'Zool. Egypt' (1902, Mamm., p. 22), and by Elliot (1913, 'Rev. Primates,' III, (1912), p. 9).

1861. *Cercopithecus poliophæus* HEUGLIN (nomen nudum). Petermann's Mitteilungen, VII, p. 13. Described and figured by Reichenbach in 1862. Type a male, brought alive by Heuglin to Vienna, where it lived for four years, and preserved as a specimen in the Vienna Museum. Said to have come originally from Fazogli, on the Blue Nile, near the Abyssinian boundary. Type redescribed by Fitzinger in 1866 (cf. Matschie, *loc. cit.*, 1905, pp. 270–271) and by Elliot (*loc. cit.*, p. 11).

1863. *Cercopithecus circumcinctus* REICHENBACH, 'Vollständ. Naturg. Affen,' p. 123, Pl. XXI, fig. 310. Based on a living animal, from an unknown locality. Face black encircled with white. (Cf. Matschie, *loc. cit.*, 1905, p. 271, and Elliot, *loc. cit.*, III, p. 17.)

1905. *Erythrocebus baumstarki* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, No. 10, p. 273. Based on a nearly full-grown female, a skin and skull, from Ikoma, east of the south end of Victoria Nyansa. Immature, the last molar not fully up. The region about the eyes is said to have been injured but that it could be seen that there was no black frontal band.

1905. *Erythrocebus zechi* MATSCHIE, idem, p. 274. Based on three young individuals from the environs of Kete Kradji, western Togo, sent alive to the Berlin Zoölogical Gardens. Black nosed. Top of head dragon-blood red; back cinnamon-red. No really distinctive features are given.

1905. *Erythrocebus kerstingi* MATSCHIE, idem, p. 274. Five specimens. Type an adult female from Sokode, Togo; four immature specimens from "Fasaú im Mono-Quellgebiet." Black nosed. Back orange-red finely sprinkled with light gray.

In addition to these two Togoland species, other specimens are referred to a third species recognized as "*Simia rufa* Schreber." Two young specimens, from Tapong, one of them "ganz jungen und einen nicht ganz ausgewachsenen." Thus it is shown that "innerhalb der Grenzen von Togo drei sehr verschiedene Husarenaffen leben."

1905. *Erythrocebus langheldi* MATSCHIE, idem, p. 276. Based on two living specimens, both young, in the Berlin Zoölogical Gardens, from Garua, Upper Benue, Cameroon. The alleged characters for the recognition of this species are without value. The younger of the two is made the type, which, says Elliot, "is so young I have not deemed it worth while to give the dimensions of the skull." The other (older) specimen has no skull.

1906. *Cercopithecus patas sannio* THOMAS, Ann. Mag. Nat. Hist., (7) XVII, February, p. 173. Type, an adult male, skin and skull, from Yo, Lake Chad. Nose black, shoulders grayish black, not yellow as in typical *patas*.

1909. *Erythrocebus formosus* ELLIOT, Ann. Mag. Nat. Hist., (8) IV, p. 264. Based on an adult skin, without skull, from Uganda; exact locality not known. Nearly related to *C. baumstarki* Matschie (1905) from Masai Land.

1909. *Erythrocebus albigenus* [sic] ELLIOT, idem, p. 265. Based on an adult male, skin and skull, from "Egyptian Soudan, exact locality not known."

1910. *Erythrocebus whitei* HOLLISTER, Smithsonian Misc. Coll., LVI, No. 2, March 31, p. 11, Pl. II (skull). Type, an adult male, skin and skull (also an adult male paratype), Nzoia River, Guas Ngishu Plateau, British East Africa.

1912. *Cercopithecus (Erythrocebus) patas albosignatus* MATSCHIE, Rev. Zool. Africaine, I, Mars, p. 433. Based on an adult female skin (no skull mentioned), from Bomu River, Belgian Congo. Black nosed. No really diagnostic characters given.

1912. *Cercopithecus (Erythrocebus) patas poliomystax* MATSCHIE, idem, p. 434. Based on an adult male skin and skull from the Upper Congo, exact locality unknown. Black nosed.

Eight of the fourteen forms listed above were based on single specimens, the types of three of them from unknown localities. Six were based on immature specimens that died in menageries. In the case of the original *patas*, a considerable number of specimens have been received from time to time at the Paris Zoölogical Gardens that were known to have come from Senegal (cf. I. Geoffroy, 1851, 'Cat. Meth. Coll. Mamm. Mus. Paris,' p. 24). Eight of the forms appear to have been based on wild-killed specimens, some of them immature, and all on single specimens except two, where the original material consisted of two specimens in one case and six in the other. The literature of the group, however, appears to furnish very few records of wild-killed material for any of the forms. The amount of such material in museums is probably small, as Elliot in his 'Review of the Primates' rarely refers to any other specimens than the types, and probably little has since been added. Hence little has been recorded in reference to individual variation in this group of guenons. My own material is restricted to the small series (five specimens) collected by the American Museum Congo Expedition as listed above; seven topotypes of *Erythrocebus whitei* Hollister; a single specimen referable to the original *patas*, an adult male from the Central Park Menagerie of New York City; and a wild-killed adult male from Uganda (without definite locality) representing *Erythrocebus formosus* Elliot.

The color pattern is essentially the same in all, but the tones and relative extent of corresponding color areas are subject to wide variation, even in specimens from the same locality. The single specimen of *C.*

patas, evidently typical although from an unknown locality, has the softest pelage and the most intense color tones of all, and the red color of the upperparts extends on the hind limbs to the knees. The single specimen from Uganda is brighter and more intensely colored than either the Upper Congo specimens or the series from the Nzoia River, British East Africa, topotypes of *E. whitei* Hollister.

E. whitei is represented by three adults (two males and a female) and four young, the latter varying in age from about one-fourth to one-half grown. The two adult males are perfectly comparable in age and were collected at the same locality, respectively on October 31 and December 30. They thus illustrate the kind and amount of individual color variation that may be expected to occur in guenons of the *patas* group. In texture of pelage and in coloration the general effect is closely similar; in details of coloration there are marked differences. In No. 34713 (which for brevity may be designated as A), collected October 31, the fronto-superciliary band is broad, uniformly and equally composed of mixed rigid black and white hairs to a point about one-third the distance between the eye and ear, and thence posteriorly consists of shorter soft black hairs without intermixture of white. In the other (No. 34714, designated for convenience B), collected December 30, the frontal band is black with a very few partly white hairs, black greatly prevailing and the white hairs are annulated with black instead of being wholly white. The cheek hairs are similar in both—white with the tips of the upper series broadly black-tipped.

In A the forehead immediately behind the frontal band is of the same tone of red as the crown; in B it is distinctly paler (about cinnamon-buff). In A the pale temporal tuft in front of the ear is very pale, many shades paler than the forehead; in B it is about the same tone as the forehead. In A the nape region is much paler than in B; yet in A the general tone of the under-pelage of the upperparts is much brighter reddish orange than in B. In A the long hair of the shoulder is scarcely different in color from the interscapular region and flanks; in B the shoulder hairs are conspicuously gray, the apical half of the hairs being broadly banded with black and narrowly subapically with white, and consequently are strikingly different from the rest of the upperparts. As a further result the upper arm is externally gray like the shoulder and unlike the rest of the upperparts, while in A it is, like the shoulder, without gray and not different from the rest of the upperparts. In A the belly is white, the tips of the hairs faintly toned with light red; in B the hairs of the belly are deep orange-red to the base. In A the tail at the extreme base (for about 50 mm.) is like the adjoining part of the back, but from this point posteriorly, on the upper surface, rapidly passes from pale cinnamon-buff to pale cream-buff, thence apically to pale yellowish white; under-surface of tail wholly white. In B the upper-surface of the tail for about the proximal fourth or third is dark brownish red, much darker than the back, fading gradually apically to about cinnamon-buff at the tip; under surface of the tail about cream-buff to the tip.

The differences between these two specimens, of the same age, sex, and locality, are greater than those indicated in the comparative descriptions of most of the forms given the status of full species by Elliot and by their original describers. While this shows the inadequacy of our knowledge of most of the hitherto described forms it does not follow that some of these forms (perhaps most of them) may not prove, when fully known, to be recognizable local races. But it is hardly probable that the three forms recognized by Matschie from Togoland will all prove tenable, or that there are two good forms in the Uele drainage of the Upper Congo, or that the form from that region is really sufficiently different from *pyrronotus* of the Upper Nile region to require a special name. Indeed, the adult male in the present collection from Faradje, Uele district, is not very appreciably different from specimen B of *E. whitei* described above; it differs from it much less, in fact, than the specimen A differs from specimen B, both from the same locality, and both from practically the type locality of *E. whitei*. For this reason I have deemed it preferable to refer provisionally the Faradje series to *pyrronotus* rather than to take for them one of Matschie's names based on Bomu and "Upper Congo" specimens.

So far as cranial measurements are available, they fail to show racial differences in size, as shown in the table of measurements on p. 431. The single middle-aged male from Faradje shows no tangible differences from *E. whitei*, the individual variation in three comparable examples of *whitei* covering the size differences of not only the Faradje specimen but also the types of *E. p. sannio* and *E. p. poliomystax*.

Different parts of the range of the *patas* group (genus *Erythrocebus* of some authors) present widely different ecological conditions, and it is a practical certainty that regional forms exist, but just how and to what extent they differ is at present unknown. The principal differences alleged are slight variations in color, mainly the intensity of color, and whether the nose patch is white or black. The texture of pelage, whether soft and rather short or long and coarse, obviously varies with the environment, and likewise the intensity of the tones of coloration, the forms of the semi-desert and sparsely wooded districts differing from those of more heavily wooded and moister districts. As in other similar groups, local differences in size are not apparent, so far as can be judged from measurements at present available. The significance of the color of the nose patch, whether black or white, has practically been solved. Adults of the West African forms, probably as far east as the Shari River, have the nose black, while adults of the more eastern districts, including those of the Upper Congo region, have the nose white. Yet young individuals of the white-nosed form have the nose black. In the present material of five specimens from the Uele district the only adult has the nose white, while all of the four young, collected at the same time and place as the adult, have the nose black; this includes one nearly full grown (the permanent teeth fully developed except the last molar). In a series of four young of *whitei*, of similar age to the Faradje series, the nose is white in the older ones and changing from black to white in the younger ones, while in six known adults of *whitei* the nose is white. Pocock, long ago (1907, Proc. Zool. Soc. London, p. 744), was led to suspect, from his observations of living examples in the London Zoölogical Gardens, that the white-nosed forms had black noses when young.

In young specimens the outside of the limbs are only a little paler than the body, the lower legs and fore arms not acquiring the white color of these parts in the adult until half-grown or until after the anterior permanent molar has reached full development; yet the type specimen of some of the described forms had not passed beyond this stage.

Among the leading characters set forth by describers as diagnostic is the brow-band, whether all black or white and black mixed, and, if the latter, whether of uniform character throughout or broken on the median line by a space all black.[1] Or again whether it reaches to the ear or ends some distance in front of it; also whether the branch extending to the sides of the crown is indistinct or strongly developed. The hairs of the crown and occiput and of the back may be minutely or strongly black-tipped in specimens from the same locality, yet such variations have been taken as racial distinctions. Also the shoulder and upper arm may be gray, or even blackish in general effect, or not different from the general color of the upperparts, as in the two examples of *whitei* above described.

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[1] The three primary divisions in Elliot's "Key to the Species" of *Erythrocebus* are: "A. Brow band black; B. Brow band white; C. No brow band." Ten species are placed in section A, one each in sections B and C (*circumcinctus* in B, *baumstarki* in C). The illustration of Reichenbach's *Erythrocebus circumcinctus* was based on an immature specimen living in confinement, from an unknown locality, some thirty years previous to its publication, and is indeterminable. It is represented as having a white brow band. *Erythrocebus baumstarki* Matschie was based on the skin of a wild-killed female, not fully grown, from Ikoma, Masailand. The region over the eyes, says the description, "ist leider bei dem vorliegenden Fell faul"; yet the author says he was able to recognize that there could have been "keine schwarze Stirnbinde" in front of the ochre-colored forehead. Elliot describes the same specimen as having "no black on forehead or on side of head." It thus seems necessary to have this exceptional character confirmed by other specimens from the type locality.

Cranial Measurements of Forms of the *Erythrocebus patas* Group

Cat. No.	Form	Sex	Locality	Greatest Length	Condylo-basal Length	Occipito-nasal Length	Zygomatic Breadth
52576	*pyrronotus*	♂	Faradje	141.0	107.2	117.4	88.3
	sannio[1]	♂	Lake Chad	143.0	98.2	127.5	88.5
	albigenus[2]	♂	Egyptian Sudan	135.0		114.0	80.0
	whitei[3]	♂	Guas Ngishu	149.0	120.0		99.0
34713	*whitei*	♂	Guas Ngishu	143.8	115.0	113.5	86.3
34714	*whitei*	♂	Guas Ngishu	147.3	117.8	118.8	89.3
	poliomystax[4]	♂	Upper Congo	150.0			93.0

Cat. No.	Form	Sex	Orbital Breadth	Postorb. Constr.	Mastoid Breadth	Length Nasals	Upper Toothrow	Upper Molars	Basal Suture
52576	*pyrronotus*	♂	73.9	49.3	65.6	27.0	44.3	21.0	Closed
	sannio[1]	♂		47.3		24.8			
	albigenus[2]	♂		47.3		25.2			
	whitei[3]	♂				22.5			
34713	*whitei*	♂	73.3	48.3	70.0	22.7	43.1	21.0	Closed
34714	*whitei*	♂	74.2	49.4	72.5	25.0	43.4	20.0	Obliterated
	poliomystax[4]	♂		53.0	73.0	27.5			

Colobinæ

COLOBUS Illiger

1811. *Colobus* ILLIGER, 'Prodr. Syst. Mamm. et Avium,' p. 69. Type, by subsequent designation, "*Simia polycomos* Schreber" = *Cebus polykomos* Zimmermann.[5]

1821. *Colobolus* GRAY, London Med. Repos., XV, April, p. 298. Type, by monotypy, *Simia polycomos* Schreber = *Cebus polykomos* Zimmermann.

1870. *Guereza* GRAY, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' pp. 5 and 19. Type, by monotypy and tautonomy, *Guereza rüppelli* GRAY = *Colobus guereza* Rüppell.

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[1] *Erythrocebus patas sannio* (Thomas). Measurements from Thomas.

[2] *Erythrocebus albigenus* [sic] Elliot. Measurements from Elliot.

[3] *Erythrocebus whitei* Hollister. Measurements from Hollister.

[4] *Erythrocebus patas poliomystax* (Matschie). Measurements from Matschie.

[5] "Ce genre [*Colobus*], crée en 1811 par Illiger, est aujourd'hui généralement adopté. Le type est la *Guenon à camail* de Buffon (suppl. VII, p. 65), présentement *Colobus polycomos*. Cette espèce étant encore imparfaitement connue, nous citerons aussi comme type le *C. guereza*, Rüpp., qui est voisin du précédent [but it was not described till twenty-four years after the genus *Colobus* was founded]." I. Geoffroy, 1851, 'Cat. Méth. Coll. Mamm. Mus. Paris,' p. 17.

1887. *Procolobus* ROCHEBRUNE, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1, pp. 95, 97. Type, by monotypy, *Colobus verus* Van Beneden.

1887. *Tropicolobus* ROCHEBRUNE, idem, pp. 96, 102. Type, by monotypy, *Colobus rufomitratus* Peters.

1887. *Piliocolobus* ROCHEBRUNE, idem, pp. 96, 105. Type, by subsequent designation (Allen, 1920),[1] *Simia (Cercopithecus) badius* Kerr.

1887. *Stachycolobus* ROCHEBRUNE, idem, pp. 96, 114. Type, by monotypy, *Colobus satanas* Waterhouse.

1887. *Pterycolobus* ROCHEBRUNE, idem, pp. 96, 125. Type, by monotypy, *Colobus vellerosus* I. Geoffroy.

1895. *Lophocolobus* POUSARGUES, Bull. Mus. Hist. Nat., Paris, I, No. 3, April 28, p. 98. Subgenus of *Colobus*. Type, by monotypy and original designation, *Colobus verus* Van Beneden. = *Procolobus* Rochebrune, 1887.

The geographic range of the genus *Colobus* is restricted to intertropical Africa, in the north from Senegambia to Abyssinia and the south from Angola to Nyasaland, throughout the greater part of which vast area forms of this group are represented. They have been recognized as constituting two groups, on the basis of coloration, commonly known as "red Colobi" and "black Colobi." Some of the "red" group, as now known, have very little red in the coloration, the prevailing color of the upper parts being some shade of dark brown. The various forms of the "black" group vary greatly in respect to development of long hair on the head, shoulders, and sides of the body, and the presence or absence of a heavy terminal tail tuft.

Rochebrune[2] in his monograph of the *Colobus* group recognized it as a family Colobidæ (Cercopithecidæ of recent authors), consisting of seven genera, five of which he proposed as new. Some of his generic groups have been recognized as subgenera by later authors, although they are based on rather slight characters. As recognized by Elliot,[3] Rochebrune's *Stachycolobus* is, however, synonymous with *Colobus* (*s.s.*), as are also Gray's *Colobolus* and *Guereza*, while *Lophocolobus* Pousargues (1895) is a strict synonym of *Procolobus* Rochebrune, both having the same genotype, as admitted later by Pousargues himself.[4]

The first described species referable to the genus *Colobus* are the "Full-bottom Monkey" and the "Bay Monkey" of Pennant, based on a specimen of each in the Leverian Museum, brought from Sierra Leone. The former was described and figured by Pennant in 1781 ('Hist. Quadr.,' I, p. 197, No. 110, Pl. XXIV), and a description was given of the latter (*loc. cit.*, p. 198, No. 111). The Full-bottom Monkey received its first systematic name from Zimmermann, who designated it *Cebus polykomos* in 1780 ('Geogr. Gesch.,' II, p. 202), his description being based on manuscript notes sent to him by Pennant. Zimmermann's account of the species thus preceded Pennant's by one year. Other technical names were given to it by later authors, all based on Pennant's description and figure, in the following sequence: *Simia* (*Cercopithecus*) *regalis* Kerr (1792, 'Anim. Kingd.,' p. 74, No. 61); *Simia tetradactyla* Link (1795, 'Beitr. Naturgesch.,' p. 62); *Simia comosa* Shaw (1800, 'Gen. Zool.,' I, pt. 1, p. 59); *Ateles comatus* E. Geoffroy (1806, Ann. Mus. Hist. Nat., Paris, VII, p. 273). Also apparently the same form was redescribed as *Colobus ursinus* Ogilby (1835, Proc. Zool. Soc. London, p. 98; and idem, 1838, p. 61), also from Sierra Leone specimens.

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[1] Journ. Mammalogy, February, p. 97.
[2] 1887, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1.
[3] 1913, 'Rev. Primates,' III.
[4] Cf. 1896, Ann. Sci. Nat. Zool., Paris, (8) III, p. 162, footnote.

The second species, Pennant's "Bay Monkey," was first technically named by Kerr, in 1792 (*loc. cit.*, p. 74, No. 62), *Simia* (*Cercopithecus*) *badius*. It was renamed *Simia ferruginea* by Shaw in 1800 (*loc. cit.*, p. 59) and *Colobus ferruginosus* by E. Geoffroy in 1812 (Ann. Mus. Hist. Nat. Paris, XIX, p. 92). Probably Ogilby's *Colobus rufoniger* (1839, 'Cat. Mamm. Zool. Soc. London,' p. 270), from Sierra Leone, is also identical. Other forms from adjoining parts of Africa are likely to represent only local forms of the *badius* group.

These two Pennantian species were the only ones enumerated by Illiger in 1811 in founding the genus *Colobus*, who cited them as *Simia polycomos* Schreber and *Simia ferruginea* Shaw, on others having been described prior to that date. It is of interest to note that one of them is a representative of the "black" group of the genus, the other of the "red" group. The next species described (*Colobus temminkii* Kuhl, 1820) was from an unknown locality and, while it has never been satisfactorily identified, is evidently a member of the red group.

The first species technically named from West Africa (from Senegambia across Upper Guinea, including the Gaboon, but excluding Lower Congo) dates, as stated, from the year 1780 (*Cebus polykomos* Zimmermann, from "Sierra Leone"). During the following years of the nineteenth century technical names were given to twenty-three other species, of which several have been assigned to synonymy by most recent writers. The last form described from this region is *Piliocolobus preussi* Matschie (1900) from North Cameroon.

The first species technically named from Western Equatorial Africa (the Congo Basin and the Upper Nile drainage south of about latitude 5° N.) dates from the year 1860 (*Colobus angolensis* P. L. Sclater, from northern Angola). The first from eastern Belgian Congo was described in 1899 (*Colobus foai* Pousargues). Four others were described during the period ending 1901, and twenty-eight more forms during the years 1913 and 1914. In all, there have been forty-two forms (species and subspecies) thus far recorded from Western Equatorial Africa.

The first species technically named from Eastern Africa (Abyssinia through East Africa to Nyasaland) dates from the year 1816 (*Lemur abyssinicus* Oken, from "Abyssinia"). Sixteen other forms from the same region have since been characterized, making seventeen in all, of which six were published during 1912–1913. Of the fifty-nine forms described from East Africa and Western Equatorial Africa together, thirty-five were described since the beginning of 1912, of which number twenty-six were described in 1913 and 1914 by a single author, Paul Matschie of the Berlin Museum.

About eighty-five names have been given to supposed species and subspecies of *Colobus*, this number including ten substitute names needlessly added by early authors, and about the same number of later date now commonly treated as synonyms, thus leaving about sixty practically unchallenged. The status and relationships of the greater part of the species described to date can be satisfactorily determined only by comparative study of large series of specimens from many different localities, in view of the now known wide range of variation due to sex, age, and individualism.

Elliot's 'Review of the Primates' went to press early in 1912, and included none of the forms published after January of that year. In his review of the genus *Colobus* he recognized only thirty forms as valid, and gave to each the status of a full species. His synonymies contain twelve additional names, which are for the most part substitute names given by early authors for personal reasons. Hence the number described since 1912 exceeds the number entitled to serious consideration published prior to that date. It seems highly probable, however, that many of these alleged forms will fail of confirmation when large series of topotypical specimens become available for comparative study. As indicated in a later part of this paper (pp. 456–460) a reaction appears to have already set in as the result of the study of large series of specimens from single localities.

The subjoined schedules of the described forms of *Colobus* are arranged to show, in chronological order, (1) the forms from West Africa, (2) Western Equatorial Africa, and (3) East Africa, with, as far as practicable, a statement of the amount and character of material on which each was originally based, and the type locality or type region as indicated in the original description.

Specific and Subspecific Names Referable to *Colobus* Described from 1780–1919

West Africa

From Senegambia across Upper Guinea, including the Gaboon, but excluding the Lower Congo

1780. *Cebus polykomos* ZIMMERMANN, 'Geogr. Gesch.,' II, p. 202. = "Full-bottom Monkey," Pennant ('Hist. Quadr.,' 1781, p. 197; *ex lit.*). "Sierra Leone," from a specimen in the Leverian Museum.

1783. *Cercopith[ecus] polykomos* ZIMMERMANN, 'Geogr. Gesch.,' III, p. 170. "Der vierfingrige afrikanische Affe, *Cercopith. Polykomos*" = *Cebus polykomos* Zimmermann, idem, 1780, II, p. 202.

"*Simia polycomos* Zimmerm." Schreber's 'Säugthiere,' legend to Plate x *D*.

Plates x *B*, x *C*, x *D*, of Schreber's 'Säugthiere' were issued, according to Sherborn (1891, Proc. Zool. Soc. London, p. 590) with Theil V, Heft. 56, 57, the date of publication for which he gives as probably 1800. Plate x *D* is cited by Shaw in his 'General Zoology,' Volume I, Part 1, p. 59, dated 1800. Hence the date of issue of this plate must have been prior to the year 1800. Wagner (1840, Schreber's 'Säugthiere,' Suppl., I, p. 108) cites Schreber's Plate x *D*, under his *Semnopithecus polycomos*, as follows: "*Simia polycomos*. Schreb. tab. 10. *D* (fig. Penn.)." The plate is a poor copy of Pennant's "Full-bottom Monkey."

It is evident from the above citations of Zimmermann (at 1780 and 1783) that the authority for the current specific name "*polycomos*" is Zimmermann (with the original spelling *polykomos*)[1] and not Schreber, and that Schreber's Plate x *B* could not have been issued prior to 1780 (not in 1775, as usually quoted).

Rochebrune[2] in his highly controversial monograph places the Full-bottom Monkey of Pennant, and all the technical names based on it, in his 'Formes douteuses ou problématiques' (*loc. cit.*, pp. 144–162), substituting in its place *Colobus ursinus* of Ogilby. As he states, and as every author who has considered the subject has doubtless recognized, Pennant's description and figure are obviously faulty, inasmuch as they represent the hair of the body short and the long white hair of the front and sides of the head so lengthened as to extend over the top of the head and nape to the shoulders, "like a full-bottomed perriwig." In other respects it agrees well with the later described *Colobus ursinus*, the species that most closely approaches it in general coloration. The Full-bottom Monkey was based on a specimen in the Museum of Sir Ashton Lever "brought over [from Sierra Leone] by Mr. Smeathman" with a specimen of his Bay Monkey, described on the following page[3] but not figured. There is thus a definite geographic origin and history for the types of both of Pennant's species, although the types themselves were lost in the dispersal of the Leverian collection. It is to be noted that Sierra Leone, the type region of *polykomos* (Full-bottom Monkey) is in the central part of the area of the known distribution of *ursinus*,[4] which was finally also established on a Sierra Leone specimen.[5] Notwithstanding the faults of

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[1] Allen, J. A. 1920, Journ. Mammalogy, I, p. 96.

[2] 1887, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, Mamm., fasc. 1, pp. 1–190, Pls. I–XXXIII.

[3] 1781, Pennant, 'Hist. Quadr.,' I, p. 197.

[4] Cf. Pousargues, 1896, 'Étude sur les Mammifères du Congo Français,' Ann. Sci. Nat., Zool., (8), III, pp. 170, 171, map and table of distribution of the forms of *Colobus*.

[5] Cf. Ogilby, 1838, Proc. Zool. Soc. London, p. 61.

Pennant's description and figure, which may have been based on a specimen altered from its natural condition by some native decorator, it seems clear that they must have had as their origin a native skin of the animal later known as *Colobus ursinus* Ogilby, a name antedated by half a century by *Colobus polykomos* (Zimmermann).

1792. *Simia (Cercopithecus) regalis* KERR, 'Anim. Kingd.,' p. 74, No. 61. Based on Pennant's Full-bottom Monkey, from Sierra Leone. = *Simia comosa* Shaw = *Cebus polykomos* Zimmermann.

1792. *Simia (Cercopithecus) badius* KERR, 'Anim. Kingd.,' p. 74, No. 62. = Bay Monkey of Pennant = *Simia ferruginea* Shaw (1800).

1795. *Simia tetradactyla* LINK, 'Beitr. Naturgesch.,' p. 62. Based on Buffon's La Guenon à Camail = Full-bottom Monkey of Pennant. (Citation from Rochebrune.)

1800. *Simia comosa* SHAW, 'Gen. Zool.,' I, pt. 1, p. 59. Based on the "Full-bottom Monkey" of Pennant (1781, 'Hist. Quadr.,' I, p. 197, No. 110, Pl. XXIV). "Inhabits Sierra Leone. This species is figured in Schreber's plates under the name of *Simia Polycomos*, but the figure is not very accurate" (Shaw, *loc. cit.*).

1800. *Simia ferruginea* SHAW, 'Gen. Zool.,' I, pt. 1, p. 59. Based on the "Bay Monkey" of Pennant (1781, 'Hist. Quadr.,' p. 198), from "Sierra Leone." Same as *Simia badius* Kerr.

1806. *Ateles comatus* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, VII, p. 273. Based on Le Camail of Buffon = Full-bottom Monkey of Pennant.

1812. *Colobus ferruginosus* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, XIX, p. 92. New name for *Simia ferruginea* Shaw.

1820. *Colobus temminkii* KUHL, 'Beitr. Zool.,' p. 7. Skin only. "Patria?" Elliot (1913, 'Rev. Primates,' III, (1912), p. 121) has suggested Senegambia. He has also given a full description of the type in the Leyden Museum (*loc. cit.*, p. 130).

1834. *Semnopithecus vellerosus* I. GEOFFROY, in Bélanger's 'Voyag. Indes-Orient.,' Mamm., p. 37. A mutilated skin without hands. "Patrie inconnue." By later authors assigned as the Gold Coast.[1]

1835. *Semnopithecus bicolor* WESMAEL, Bull. Acad. Sci. et Belles-Lettres Bruxelles, II, p. 237. "Le *S. bicolor* paraît originaire des côtes d'Afrique." = *Colobus vellerosus* (I. Geoffroy).

1835. *Colobus fuliginosus* OGILBY, Proc. Zool. Soc. London, p. 97. An adult (type) and another, immature specimen from Gambia, received from Mr. Rendall.[2]

1835. *Colobus ursinus* OGILBY, Proc. Zool. Soc. London, p. 98; idem, 1838, p. 61. Two imperfect skins without head or hands. "Algoa Bay." Later redescribed from a complete skin from Sierra Leone.

1837. *Colobus leucomeros* OGILBY, Proc. Zool. Soc. London, p. 69. Skin only. "Africa."

1838. *Colobus rufofuliginus* OGILBY, 'Nat. Hist. Monkeys, Opossums, Lemurs,' Menageries, I, p. 270. Substitute name for the same author's *C. fuliginosus* of earlier date (Ogilby, 1835).

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[1] "Type de l'espèce [*Colobus vellerosus*]. Peau mutilée, faisant partie des collections rapportées du Brésil par M. Delalande en 1816. Elle venait, d'après les renseignements recueillis par lui, de la côte occidentale d'Afrique." (I. Geoffroy, 1851, 'Cat. Méth. Coll. Mamm. Mus. Hist. Nat. Paris, p. 17.)

[2] Elliot (1913, 'Rev. Primates,' III, (1912), p. 134) says: "Type not now in British Museum." In 1851, according to I. Geoffroy (*loc. cit.*, p. 17), the cotype was in the Paris Museum, it having been presented by the Natural History Museum of Lyon.

1838. *Colobus rufoniger* OGILBY, 'Nat. Hist. Monkeys, Opossums, Lemurs,' Menageries, I, p. 273. Type, a flat skin, imperfect, lacking hands and feet, from Sierra Leone.

1838. *Colobus verus* VAN BENEDEN, Bull. Acad. Sci. et Belles-Lettres Bruxelles, V, p. 347, Pl. opp. p. 344 (animal). Skin and skull. "Afrique." Range, as assigned by later authors, Liberia to Ashanti.

1838. *Colobus pennantii* WATERHOUSE, Proc. Zool. Soc. London, p. 57. Two imperfect skins. "Island of Fernando Po."

1838. *Colobus satanas* WATERHOUSE, Proc. Zool. Soc. London, p. 58. Three imperfect skins, without hands or feet. "Island of Fernando Po."

1840. *Semnopithecus (Colobus) olivaceus* WAGNER, Schreber's 'Säugthiere,' Suppl., I, p. 309. Substitute name for *Colobus verus* Van Beneden.

1857. *Semnopithecus anthracinus* LE CONTE, Proc. Ac. Nat. Sci. Philadelphia, IX, p. 10. A skin from the Gaboon, from Du Chaillu's Collection. =*Colobus satanas* Waterhouse.

1866. *Colobus cristatus* GRAY, Ann. Mag. Nat. Hist., (3) XVII, p. 77; 1868, Proc. Zool. Soc. London, p. 182, Pl. xv (animal to the rear). "West Africa." Later admitted by Gray (1870, 'Cat. Monkeys, Lemurs and Fruit-eating Bats,' p. 128) to be the same as *Colobus verus* Van Beneden.

1887. *Piliocolobus bouvieri* ROCHEBRUNE, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1, p. 108, Pl. IV (animal). "Gambia." Figure from a photograph taken by M. Thollon, "attaché à la mission Brazza." "Plusiers exemplaires, du même type, proviennent de l'expédition Brazza." Positively referred by Pousargues (1896, Ann. Sci. Nat., Zool., (8) I, p. 263; and idem, 1896, (8) III, pp. 157, 160) to *Colobus pennantii*.

1900. *Piliocolobus preussi* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 183. Skin only, from "Barombi am Elefanten-See in Nord-Kamerun."

Western Equatorial Africa

Congo Basin and Upper Nile Drainages south of about 5° N.

1860. *Colobus angolensis* P. L. SCLATER, Proc. Zool. Soc. London, p. 245. Skin, without skull, feet or face. Near Bembe, North Angola.

1886. *Colobus tholloni* RIVIÈRE,[1] Rev. Scient., (3) XII, p. 15. Female[2] skin with skull. Lower Congo. No definite locality indicated. Rochebrune (1887, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1, p. 110) gives several localities of its occurrence, from the junction of the Kasai River with the Congo to the mouth of the latter (cf. *infra*, p. 443).

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[1] *Colobus tholloni* is universally ascribed to A. Milne-Edwards. The first reference to this name that I have been able to find is in an article by E. Rivière entitled: "Exposition de la mission Brazza au Muséum," published in Revue Scientifique, Série 3ᵉ, 23ᵉ année, 2ᵉ semestre, No. 1, 3 Juillet 1886, pp. 13-23, where (p 15) Rivière mentions "les colobes," of which he says four species are known at the Mission, "l'une d'elles est absolument nouvelle." He states that two of them "sont de couleur rousse," one of them being known as "*Colobus ferrugineus* ou *Pennanti* (Ogilby); le second est d'espèce nouvelle: il a été désigné par M. Milne Edwards sous le nom de *Colobus Tholloni;* il ressemble au précédent par ses teintes générales, mais il est facile de l'en distinguer à cause du développement que prennent les poils de la région postérieure du corps, qui au-dessous de la queue, forment une sorte de panache." This is doubtless the first published description of the species and the first publication of the name *Colobus tholloni*, which Milne-Edwards had probably employed as a manuscript name for specimens in the Paris Museum. Therefore, according to present usage, the authority for the name *Colobus tholloni* is Rivière (*Colobus tholloni* Rivière, ex Milne-Edwards Ms.).

[2] Pousargues (1899, Bull. Mus. Hist. Nat., Paris, V, p. 279, footnote) says the two known specimens are females, the type being indicated as a male in error.

1887. *Guereza occidentalis* Rochebrune, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1, p. 140, Pl. xiii (animal). Noki, near mouth of Congo.

1899. *Colobus foai* Pousargues, Bull. Mus. Hist. Nat., Paris, V, p. 278. An imperfect skin, without hands, feet, or skull. Ouroua country, west of Lake Tanganyika, Belgian Congo.[1]

1899. *Colobus matschiei* Neumann, Sitzungsb. Ges. Naturf. Fr. Berlin, January, p. 15. Skin with skull. Kavirondo, Ugowe Bay, Lake Victoria.

1901. *Colobus ruwenzorii* Thomas, Proc. Zool. Soc. London, II, May 7, p. 85. Skin only. Buamba Country, northwest slope of Mt. Ruwenzori, Belgian Congo.

1905. *Colobus palliatus cottoni* Lydekker, Ann. Mag. Nat. Hist., (7) XVI, October, p. 432. Skin with skull. Zokwa, between Mahagi and Irumu, headwaters of the Ituri River, west of Lake Albert Edward, Belgian Congo. Not "Qugo," a misprint for Zokwa (cf. Matschie, 1913, Rev. Zool. Africaine, II, p. 204).

1906. *Colobus nigrimanus* Trouessart, Bull. Mus. Hist. Nat., Paris, XII, p. 444. Liranga, left bank of the Congo, Equatorial French Congo.

1906. *Colobus oustaleti* Trouessart, Bull. Mus. Hist. Nat., Paris, XII, p. 443. Skin with skull. Youmba country, Oubangui, Belgian Congo.

1907. *Colobus tephrosceles* Elliot, Ann. Mag. Nat. Hist., (7) XX, September, p. 195. Three specimens, one adult (type) and two immature. Ruahara River, Toro (east side of Mt. Ruwenzori, altitude 4000 feet), Uganda.

1908. *Colobus angolensis sandbergi* Lönnberg, Arkiv för Zool., IV, No. 15, April 28, p. 1, text-fig. 1. Skin only, hands and face missing. Near Lufizi River, tributary of Zambezi River, Portuguese Angola.

1909. *Colobus graueri* Dollman, Ann. Mag. Nat. Hist., (8) IV, November, p. 474. Adult male, skin with skull (type), and an immature male. Wabembeland, 80 kilometers west of the north end of Lake Tanganyika, Belgian Congo.

1909. *Colobus ellioti* Dollman, Ann. Mag. Nat. Hist., (8) IV, November, p. 475. Skin only. Ninety kilometers west of the south end of Lake Albert Edward, Belgian Congo. (Probably near Oso River.)

1913. *Colobus (Guereza) matschiei uellensis* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 47. Skin and skull. "Uelle," Belgian Congo.

1913. *Colobus (Guereza) matschiei ituricus* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 48. Type, adult male skin with skull. "Ituri." Also half a dozen other skins, mostly from Irumu and Mawambi, Ituri Forest, Belgian Congo.

1913. *Colobus (Colobus) palliatus weynsi* Matschie, Rev. Zool. Africaine, II, February, p. 207. "Unterer Congo." According to Lönnberg, District of Lake Leopold II (*loc. cit.*, 1919, VII, p. 116).

1913. *Colobus (Guereza) matschiei dianæ* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 49. Type, adult male, skin with skull from Kissenge; and eleven other specimens from Kissenge and Sassa River, east side of Lake Albert Edward.

1913. *Colobus (Colobus) palliatus mawambicus* Matschie, Rev. Zool. Africaine, II, February, p. 205. Type, a young male, mounted, skull separate, No. 766, Tervueren Museum, Powell-Cotton Coll. Also three other specimens. Type locality, "Bei Nord Pemba, zwischen Irumu und Mawambi am oberen Ituri."

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[1] Matschie (1900, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 189) gives: "Urua, zwischen dem Tanganyika und den oberen Congo-Zuflüssen."

1913. *Colobus (Guereza) matschiei dodingæ* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 52. Type, adult male, with six other specimens from Dodinga Mts. (33° 42′ E. L., 4° 10′ N. L.), altitude 5650 feet; three others from southwest of Tarangole, northeast of Dufile.

1913. *Colobus (Guereza) matschiei brachychaites* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 53. Five specimens from between Kaya and Dufile, Lado Enclave. Altitude 2000 feet.

1913. *Colobus (Piliocolobus) lovizettii* Matschie, Rev. Zool. Africaine, II, February, p. 207. Two mounted skins with skulls. Type, semi-adult female, the other an adult female. Kutu, Lake Leopold II, Belgian Congo.

1913. *Colobus (Piliocolobus) powelli* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 61. Type, adult male, and six other specimens, skins with skulls. Zokwa, between Mahagi and Irumu, west of Lake Albert, Belgian Congo.

1913. *Colobus abyssinicus terrestris* Heller, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 7. Type, and only specimen, an adult female. Rhino Camp, Lado Enclave.

1914. *Colobus langheldi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 337. Type, male, skin only. Native skin from Manyema country, west of Lake Tanganyika, Belgian Congo. (Skin bought from a caravan stopping at Ujiji.)

1914. *Colobus adolfi-friederici* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 337. Type, adult male, skin with skull. Rugege forest, east of Lake Kivu.

1914. *Colobus benamakimæ* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 337. Type, adult male, skin only. Bena Makima, Sankuru River, Belgian Congo.

1914. *Piliocolobus kabambarei* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 338. Type, adult female, skin with skull. Near Kabambare, between Baraka and Kasongo on the Lualaba River, northwest of Lake Tanganyika, Belgian Congo.

1914. *Piliocolobus lulindicus* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 338. Type, adult female, skin and skull. Lulindi River, near Kasongo, Belgian Congo.

1914. *Piliocolobus anzeliusi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 339. Type, adult male, skin with skull. Upper Ituri River, Belgian Congo.

1914. *Piliocolobus ellioti melanochir* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 339. Type, male, skin with skull. Between Beni and Irumu, upper Irumu River, Belgian Congo.

1914. *Tropicolobus gudoviusi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 340. Type, adult male, skin only. Between Ussuwi and Ihangiro, west of Lake Victoria, German East Africa.

1914. *Colobus (Guereza) escherichi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 342. Adult male, skin with skull, from Gombe, on the Sanga River between Ikelemba and Knick, French Congo.

1914. *Colobus (Tropicolobus) umbrinus* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 343. Two adult male skins with skulls, from Bungi, on the Sanga River between Wesso and Ikelemba, French Congo.

1914. *Colobus* (*Tropicolobus*) *schubotzi* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 345 (in text). Skin only. Near Koloka, between the Likati and Bima Rivers, Belgian Congo.

1914. *Colobus* (*Piliocolobus*) *likualæ* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 346. Adult female (type) and immature female, skins with skulls, from Sanga River, opposite the mouth of the Likuala River, French Congo.

1914. *Colobus mawambicus nahani* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 335. Type, adult female, Panga, Aruwimi River, Belgian Congo.

1914. *Colobus maniemæ* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 336. Type, adult male, skin with skull. Between Kibombo and Pienimulamba, Luala River, Belgian Congo.

1914. *Colobus occidentalis ituricus* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, November, p. 508. No type designated. Based on nine specimens, four males, four females, and one young male, collected by Grauer, at the eastern edge of the forest near Mawambi, Belgian Congo.

1914. *Colobus* [*Tropicolobus*] *multicolor* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, July, p. 385. "Ein einzelnes Exemplar, bei Mawambi am Ituri erbeutet." Referred to the subgenus *Tropicolobus*.

1914. *Colobus* [*Tropicolobus*] *variabilis* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, July, p. 383. No type designated. Based on a series of over 30 specimens from the "Gebiete des Ituri-Urwaldes," collected by Grauer. Referred to the subgenus *Tropicolobus*.

1914. *Colobus occidentalis rutschuricus* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, November, p. 508. Based on a female from "Sassaflusse, am nordöstlichen Rande der Rutschuruebene (südöstlich vom Albert-Edwardsee)."

1919. *Colobus* (*Piliocolobus*) *brunneus* LÖNNBERG, Rev. Zool. Africaine, VII, October, p. 112. Four specimens from three localities; type from Sili, Upper Uele, Belgian Congo.

East Africa

Abyssinia through East Africa to Nyasaland

1816. *L*[*emur*] *abyssinicus* OKEN, 'Lehrb. Naturgesch.,' Th. III, Abth. 2, p. 1182. Abyssinia.

1835. *Colobus guereza* RÜPPELL, 'Neue Wirbelth.,' Säug., p. 1, Pl. I (animal). South and west Abyssinia ("Provinzen Godjam and Kulla").

1868. *Colobus kirki* GRAY, Proc. Zool. Soc. London, p. 180, Pl. XV (animal). One specimen, subadult. Zanzibar.

1868. *Colobus palliatus* PETERS, Monatsb. Ak. Wiss. Berlin, p. 637; idem, 1879, p. 830, Pl. IV (animal). Two subadult males. East coast of Africa near Zanzibar.

1870. *Guereza rüppellii* GRAY, 'Cat. Monkeys, Lemurs, and Fruit-eating Bats,' p. 19. *Colobus guereza* Rüppell renamed.

1879. *Colobus rufomitratus* PETERS, Monatsb. Ak. Wiss. Berlin, p. 829, Pls. IA, II (animal and skull). Muniuni, Tana River, British East Africa.

1885. *Colobus guereza caudatus* THOMAS, Proc. Zool. Soc. London, p. 219, Pl. XII (animal). One specimen, Useri, northeast flank of Mt. Kilimanjaro at 3000 feet, German East Africa.

1900. *Colobus abyssinicus poliurus* THOMAS, Proc. Zool. Soc. London, November, p. 800; idem, 1902, II, p. 308. Several specimens, besides some native skins. Omo River, north of Lake Rudolf, Abyssinia.

1900. *Piliocolobus gordonorum* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 186. A mutilated skin, without head, feet, tail, or skull. Udschungwe Mts., Uhehe, German East Africa.

1902. *Colobus gallarum* NEUMANN, Sitzungsb. Ges. Naturf. Fr. Berlin, March, p. 49. Mountains near source of Webbi Shebeli, near Harar, Abyssinia.

1902. *Colobus sharpei* THOMAS, Proc. Zool. Soc. London, I, February 18, p. 118. Type, old female skin with skull. Fort Hill, Nyasa-Tanganyika Plateau, northern Nyasaland.

1912. *Colobus abyssinicus kikuyuensis* LÖNNBERG, Ann. Mag. Nat. Hist., (8) IX, January, p. 63. Escarpment Station, British East Africa.

1913. *Colobus* (*Guereza*) *poliurus managaschæ* MATSCHIE, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 54. Three skins with skulls. Managascha forest, west of Addis Abbeba, Abyssinia.

1913. *Colobus* (*Guereza*) *caudatus thikæ* MATSCHIE, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 56. Five adult skins with skulls. West slope of Mt. Kenia, at an altitude of about 7500 feet. British East Africa.

1913. *Colobus* (*Guereza*) *caudatus laticeps* MATSCHIE, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 57. Skin with skull. West slope of Mt. Kenia, altitude 7400 feet. (Taken at same time and place as one of the paratypes of *Colobus caudatus thikæ*.)

1913. *Colobus abyssinicus roosevelti* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 5. Type, adult male, skin with skull, and three other specimens. Mau forest, near Enjoro, British East Africa.

1913. *Colobus abyssinicus percivali* HELLER, Smithsonian Misc. Coll., LXI, No. 17, October 21, p. 6. Type, adult male, skin with skull, and another adult male. Mount Uaragess, British East Africa.

Colobus tholloni Rivière[1]

Colobus tholloni RIVIÈRE (*ex* A. Milne-Edwards Ms.), 1886, Rev. Scient., (3) XII, July, p. 15. Two females, adult and semiadult, skins with skulls. Left bank of Congo, opposite Brazzaville.

Piliocolobus tholloni ROCHEBRUNE, 1887, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, Mamm., fasc. 1, p. 110, Pl. v (animal).

Colobus tholloni POUSARGUES, 1896, Ann. Sci. Nat., Zool., (8) III, pp. 150–156, 167; 1899, Bull. Mus. Hist. Nat., Paris, V, p. 279. Type stated to have been a semiadult female, not a male as had been previously stated.

Represented by four specimens collected as follows:

Lukolela, 2 (♀ adult, ♀ juvenile, skins with skulls), December 17, 1909.

Bolobo, 2 (♀ adult—skull only, ♂ juvenile—skin with skull), July 16, 1909.

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[1] Cf. footnote p. 437.

These specimens agree closely with the descriptions given in detail by Rochebrune and by Pousargues (*loc. cit.*). The adult female from Bolobo is represented by only the skull, the collectors being unable to obtain the skin, but measurements were secured from the animal in the flesh. The young male from the same locality, of which skin and skull were both obtained, is very young (with the complete milk dentition only), but agrees in coloration with the adult from Lukolela, leaving no doubt as to its determination. One of the two females from Lukolela is an old adult with greatly worn teeth, ankylosed cranial sutures and a strongly developed sagittal crest; the other is much younger, the permanent canine being only partly up, and the last molar of the permanent series just breaking through the alveolus. Both specimens are represented by skin and skull. The distribution of the color areas is the same in both, but in the older specimen the tones are more intense than in the subadult.

Adult Pelage.—In the old female from Lukolela the upperparts are deep dark red, darkening to black suffused with reddish on head and neck, and extending thence posteriorly to the middorsal region as a broad blackish diffused band, leaving the lower back, sides of body, outside of limbs and basal half of tail deep red; a frontal band of long, intensely black, bristly hairs is continued on either side of the head, covering the lower part of the ears and forming conspicuous superciliary bands; apical two-thirds of upper surface of hands and feet are darkened to brownish black, toned with purplish; the tail gradually darkening apically to a purplish black tip. Ventral surface and inside of thighs are so thinly haired that in places the skin is nearly naked; the hairs that remain are yellowish or grayish white. In the immature specimens these parts are covered with a short silky fur, which is nearly white on the throat, thoracic region, and inside of upper arms and thighs.

The tufts of long, purplish-red hairs at each side of the base of the tail are thinly developed, in comparison with the heavy, curved, drooping tufts shown in Rochebrune's plate; these tufts are heavier in the younger specimens than in the old adult, reaching a length of about 110 mm.; in the latter they are not especially noticeable and have an abraded appearance, although the longest hairs attain a length of 75 to 80 mm.[1]

Collectors' measurements of the adult female from Lukolela: Total length, 1270 mm.; head and body, 580; tail vertebræ, 690; hind foot, 170; ear, 35. Adult female from Bolobo: Total length, 1012; head and body, 600; tail vertebræ, 412; hind foot, 150.

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[1] These tufts are found in other members of the red *Colobus* group, as mentioned later (p. 452) under *Colobus powelli powelli*.

The cranial measurements of the two adult skulls, both females, are as follows: Greatest length, Bolobo 103.0, Lukolela 105.5; condylobasal length, B. 82.3, L. 87.0; occipitonasal length, B. 82.3, L. 86.4; zygomatic breadth, B. 71.5, L. 74.2; interorbital breadth, B. 10.0, L. 10.0; postorbital constr., B. 39.2, L. 41.0; breadth braincase, B. 54.5, L. 56.7; mastoid breadth, B. 54.0, L. 60.5; upper toothrow (c-m^3), B. 37.0, L. 38.5; upper molars, B. 21.0, L. 21.6; condition of teeth, B. not worn, L. greatly worn.

DISTRIBUTION.—No definite type locality nor type is indicated for the species in the original description. Elliot gives the type locality simply as "Congo." Rochebrune gives "Région du Congo, d'où les exemplaires du Muséum ont été rapportés par M. Thollon, voyageur attaché à la mission Brazza." The localities specified are "Nokki, Kissango, Makoko, Loango." Pousargues (*loc. cit.*, 1896, p. 150) has recorded a specimen (adult female) from "Rive gauche du Congo, près Brazzaville, 1890," received from M. Thollon. Bolobo and Lukolela, where the present specimens were taken, are respectively about 160 and 260 miles north of Brazzaville on the left bank of the Congo, and only 60 and 160 miles from Makoko.

Colobus langi, new species

Plates CII, CIII

Type, No. 52290, old ♂. Cotypes, No. 52291, adult ♀, and No. 52292, subadult ♂. All collected at Risimu, between Stanleyville and Bafwaboli, Belgian Congo, September 8, 1909; Herbert Lang and James P. Chapin. American Museum Congo Expedition. Orig. No. of type, 19.

A small sized *Colobus* of the *C. ellioti* group, with head conspicuously crested.

Type: A narrow black frontal band passing backward over the eyes, the tips of the long hairs reaching beyond base of ears. Top of head, cheeks, nape, shoulders, and fore limbs (including hands) dark maroon; rest of upperparts, and hind limbs (including feet) dark sepia washed with black; tail from near base to tip black; foreneck and pectoral area reddish fawn; rest of underparts slate gray, lighter on inside of thighs and inguinal areas. The transition in color, both above and below, from maroon on the anterior half to dark sepia on the posterior half is abrupt and extends to the roots of the hairs.

In the subadult male and in the adult female the coloration and the color areas are as in the old male (type), except that the tones are less intense. In the skull of the type (Pls. CII,CIII) the teeth are greatly worn, all the cranial sutures are ankylosed, and the sagittal crest is well developed. The subadult male has the permanent dentition fully developed except that the canines are not fully grown. The female is a middle-aged adult.

The collectors' measurements of the three specimens are as follows:

Cat. No.	Sex and Age	Total Length	Head and Body	Tail Vertebræ	Hind Foot
[1]52290	♂ old adult	1165	500	665	170
52292	♂ juvenile	1080	470	610	165
52291	♀ adult	1135	485	650	170

The cranial measurements of the same three specimens are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth	Interorb. Breadth
♂	105.8	80.5	88.2	81.0	10.3
♂ juv.	93.2	72.7	78.6	65.8	7.4
♀	95.6	75.5	83.0	70.8	9.3

	Postorb. Constr.	Breadth Braincase	Mastoid Breadth	Upper Toothrow	Upper Molars
♂	40.0	63.3	63.4	35.5	20.0
♂ juv.	36.4	51.2	52.2	34.0	19.2
♀	40.0	52.0	55.6	32.0	19.0

Colobus langi is readily distinguished from all other members of the *Tropicolobus* group (of Elliot's 'Rev. Primates') thus far described by its small size and the unique fore-and-aft distribution of the color areas and especially the abrupt transition from the deep reddish (maroon) of the anterior half of the body and fore limbs to the dark sepia of the posterior half and hind limbs.

Colobus ellioti Dollman

Colobus ellioti Dollman, 1909, Ann. Mag. Nat. Hist., (8) IV, November, pp. 475–476. Type, adult male, skin only, collected by R. Grauer, 90 kilometres west of the south end of Lake Albert Edward.

Represented by one specimen, skin with skull, adult female (No. 52286), Avakubi, June 23, 1914.

There is no doubt whatever that this specimen is referable to *Colobus ellioti* Dollman, the type locality of which is about 150 miles south of Avakubi. In coloration it so closely agrees with Dollman's very careful description of the type that the present Avakubi specimen might have served as the basis of the description. Another specimen taken the same day at the same locality, also an adult female, is entirely different from it in coloration and represents an average specimen of the *Colobus* of the Akenge-Niapu district, of which there are thirty-nine adult specimens. The *ellioti* specimen is the only one with red cheeks, red throat and red chest in the American Museum's Akenge-Niapu-Faradje series of eighty-five specimens.

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[1] Type.

There are unfortunately no field measurements of this specimen. Measurements from the skin are as follows: Total length, 1285 mm.; head and body, 700; tail, about 585; or a little less than the measurements of the male type, also from a skin. The skull measures: Greatest length, 102.0; condylobasal length, 85.1; occipitonasal length, 83.5; zygomatic breadth, 74.7; orbital breadth, 61.5; interorbital breadth, 10.2; postorbital constriction, 40.5; breadth of braincase, 57.5; mastoid breadth, 60.2; upper toothrow (c-m^3), 35.7; upper molars, 20.7.

Colobus powelli powelli Matschie

Plates CIV; CV, Figure 1; CXII–CXXI

Colobus (*Piliocolobus*) *powelli* MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), pp. 61–64. (Date of publication of fascicule 2, in which Matschie's paper appeared, as given on the wrapper, "Août 1913.") Type, adult male, skin with skull. "Am 13. Juni 1905 bei Zokwa in einer Höhe von 5350 F. auf der Strasse zwischen Mahagi und Irumu, westlich vom Albert-See im Gebiete der Zuflüsse des oberen Ituri von Herrn Major Powell-Cotton erlegt." Also six other specimens collected at the same date and place.

Represented by 43 specimens accompanied by 3 skeletons collected as follows:

Abawe, 2 (adult ♂, adult ♀), September 23, 1913.

Akenge, 27 (all adult but 2, sexes about equally represented), September 26–October 30, 1913.

Niapu, 8 (5♂, 3♀, all but one adult), November 20–December 2, 1913.

Medje, 1 (adult ♂, skull only), July 20, 1914.

Gamangui, 3 (3 ♂, 2 adult, 1 juvenile), February 14–16, 1910.

Bafwabaka, 1 (adult ♂), July 27, 1914.

Avakubi, 1 (adult ♀), August 1914.

The external measurements—average (minimum-maximum)—of twenty-nine adults of *Colobus powelli powelli*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
17♂	1262(1140–1351)	540(455–590)	726(650–800)	186(170–198)	39(35–42)
12♀	1235(1150–1340)	524(480–565)	713(645–790)	182(170–202)	37(35–40)

The cranial measurements—average (minimum-maximum)—of twenty-three adults of *Colobus powelli powelli* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
13♂	113.2(105.1–128.0)	91.5(86.2–97.9)	93.4(87.7–107.6)	85.6(77.4–96.7)
10♀	103.0(95.5–109.7)	81.3(77.3–89.7)	85.7(79.5– 91.3)	75.7(71.7–78.6)

	Orbital Breadth	Interorb. Breadth	Postorb. Constr.	Braincase Breadth
13 ♂	67.6(63.3–77.4)	9.8(9.1–10.7)	42.9(39.7–49.7)	60.4(54.5–69.4)
10 ♀	62.0(56.7–67.2)	9.8(8.4–10.7)	41.1(39.7–43.0)	58.0(55.6–60.4)

	Mastoid Breadth	Upper Toothrow (c–m^3)	Upper Molars
13 ♂	65.5(60.0–69.8)	40.3(38.0–44.0)	21.5(19.6–25.0)
10 ♀	61.1(59.2–64.1)	35.9(34.2–38.0)	21.0(20.1–21.9)

These forty-three specimens were all collected in a small area extending from Avakubi north to Akenge, a distance of about 100 miles, and from Niapu east to Bafwabaka, a distance of about 70 miles, in a region of uniform environment. They present an extremely wide range of color variation, mainly individual but due in part to sex and age. Only three or four of them are in first pelage. They are all referable to a single subspecific group.

The American Museum Congo collection of the *powelli* type (as here recognized) comprises altogether 85 comparable specimens of skins and skulls, of which about 75 are adult, the others immature. Two environmental areas are represented, the heavy rain forest, and the forest galleries of the bush-veldt or "savannah" region. The first includes 43 specimens, of which 29 are from Akenge and vicinity, 8 from Niapu, and 6 from Gamangui and neighboring points; the second includes 42 specimens of which 40 are from Faradje and 2 from Bafuka. Although the range of individual variation is enormous, these specimens when laid out by localities for direct comparison as geographic series, clearly demonstrate the presence of two forms, those from the forest galleries of the veldt country being much paler and duller colored than those from the heavy rain forest; the colors, while varying more or less with each individual, are of a much duller tone and far less intense and lustrous in the Faradje series than in the Akenge-Niapu series. The five specimens from the Gamangui-Bafwabaka district are the richest and most intensely colored of all, leading to the conjecture that the animals from the Aruwimi drainage may prove racially separable from those of the upper Rubi and upper Poko districts. In the present uncertainty respecting the names they should receive, (i.e., whether any of those already proposed would be applicable), it seems preferable to refer, at least tentatively, all of the rain forest specimens to a single form (*powelli s.s.*). For the more northern form Lönnberg's *Colobus brunneus* seems applicable, though not in as comprehensive a sense as is implied by the original description (see below, p. 453). The distribution of the light and dark color areas is the same in both forms, and the individual variation in color tones is of the same irregular character. The fact that the two series were taken at nearly the same time of year (the Niapu and Faradje series mainly in the month of November and the Akenge series in October) is evidence that the difference is not seasonal.

The external and cranial measurements (pp. 445–446) are based exclusively on fully adult specimens, in which the permanent dentition is fully developed. Respecting the presence or absence of a sagittal crest in males it is of interest to note that the development of this crest begins earlier in some individuals than in others, some of the younger males in which the teeth are very little worn having the sagittal crest as strongly developed as other males which have all the marks of old age. Neither is size, in either sex, always correlated with age, the largest in either external or cranial measurements being by no means the oldest of the series taken at the same locality.

Sexual Variation.—Males average about ten per cent. larger than females, on the basis of the greatest length and the zygomatic breadth of skull. The largest females of a series (usually old adults) rarely equal the smallest males (usually young adults). In addition to the difference in general size is the much greater sexual difference in the development of the canines, which in old males are several times larger than in females of corresponding age.

There is also considerable sexual difference in coloration, the males being as a rule more richly colored than the females, but there are many exceptions, coloration alone being an unsafe indicator of sex, but by aid of certain pelage distinctions, combined with the age of the individual, a pretty safe decision can usually be made. There is much less difference between young males and females than when both are middle-aged or old. Females often have the ear-tufts less developed than males, and also the bunches of long hair at the front border of the shoulder and proximal part of the upper arm, which are usually much heavier in old males than in old females or than in young males.

Individual Variation in Size.—As shown by the measurements (pp. 445–446) the range of size variation is noteworthy, especially in the skull. The largest and smallest females are both specimens with unworn teeth, representing the youngest of the series of ten specimens. A nearly parallel condition occurs in the males, among which the largest specimens are sometimes much younger (with unworn teeth) than others that are much older (teeth greatly worn).

There are marked discrepancies in cranial measurements in both sexes, but in an exaggerated degree in the males, between the axial and the transverse dimensions, notably between the orbital and zygomatic breadth in relation to the length of the skull, which sometimes give astonishingly high ratios of variation, much higher in males than in females. In adult males with unworn teeth the variation in the ratio of the zygomatic breadth to the greatest length of the skull runs to 20% or more, and in the ratio of orbital breadth to the greatest length also to 20%. In adult females of the same age class it is only about one-half as great as in males, or about 10%.

INDIVIDUAL VARIATION IN COLORATION.—The variation in color tones in individuals of the same sex and age from the same locality, collected at the same season (usually the same week in the case of the present series) is simply astounding. The variations are not merely in the general tone of the pelage as a whole, but of the same parts in different individuals. Detailed descriptions of some fifteen specimens were at first prepared for the purpose of showing the range of color variation in the large Akenge series (with which the variations in the smaller Niapu series consistently agree), but for this résumé it seems better to take the different areas of the animal separately, as (1) the head, (2) dorsal area, (3) sides of the body, (4) underparts, (5) fore limbs (including hands), (6) hind limbs (including feet), and (7) tail.

1. Head.—A conspicuous feature is the frontal band of rather coarse, lustrous black hair, continued as an "eyebrow band" nearly to or beyond the anterior base of the ears. This varies in width in different individuals and in the length of the hairs, which may not reach to the anterior base of the ears or may extend to beyond their posterior base. Behind the frontal band the whole top of the head and occiput may be of a uniform tone of reddish brown, varying in different individuals from reddish black or dark Indian chestnut[1] to light dull brick red, without black-tipped hairs, or with a few such hairs, or with the prevailing color black to the base of the pelage. The long coarse black hair at the antero-internal base of the ears forms usually a long, thick, conspicuous tuft, considerably exceeding the height of the ears. These tufts vary greatly in length and fulness in different individuals, being sometimes much reduced. Immediately behind the ears is a tuft of long, fine hair, mostly whitish or cream white at base with blackish tips. The sides of the head (or "cheeks") are usually black on the upper third, gradually becoming more whitish on the middle and lower thirds, grizzled with black tips, for the most part gray or silvery gray in general effect. *In no instance in*

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[1] The color terms here employed are those of Oberthür and Dauthenay's 'Répertoire de Couleurs, 1905.

the present large series are the sides of the head red, or in any degree toned with reddish, as specimens from the eastern border of the Ituri Forest are said to be. Chin and interramal space nearly bare, with whitish or blackish, or mixed whitish and blackish, short scattered hairs.

2. Dorsal Area.—The nape and shoulders are frequently heavily washed with blackish, varying to maroon and chocolate, restricted to the apical fourth or third of the pelage, the basal portion reddish, varying in tone and intensity in different individuals from dark Indian red to dark mineral brown, the basal portion often showing through the surface. The superficial tones of the shoulders grade into the lighter tones of the back and rump, these parts being generally much less dark at the surface than the shoulders and nape. It is impossible to indicate all the variations, as rarely are two specimens alike in either the basal or superficial tones of the pelage. The pelage of the back differs from that of the nape and shoulders in lacking the deep reddish tones at the base; the surface color extending nearly to the roots of the hairs, becoming gradually less intense, changing to smoke gray or even sepia.

In middle-aged and older examples the dorsal pelage, in both sexes, is vermiculated subapically with narrow pale yellowish and black bands, most strongly on the lower back and rump. This feature varies greatly in different individuals of comparable ages.

3. Sides of Body.—Usually the basal tones of the nape and shoulders are the prevailing color of the sides of the body, which is exceedingly variable in different individuals; the general effect is rendered more vivid through the absence of blackish hair-tips. The usual tone varies from pale chamois to reddish salmon.

4. Underparts.—The underparts are less variable than the upperparts, being usually of some shade of pale yellowish, ranging from creamy white to dark cream yellow, with a silky luster. The chief variations are to a lighter tone on the throat and lower abdomen and to gray on the foreneck and chest. In some old males the gray extends over the greater part of the ventral surface from the foreneck to beyond the thoracic area, and ranges in tone in different individuals from light ashy gray to deep mouse-gray. In young males and in the majority of females these gray areas are either absent or feebly developed.

5. Forelimbs.—A long thick pelage like that of the shoulder continues over the basal third or half of the outer surface of the upper arm and, with very little change in color, frequently to the elbow; thence it gradually becomes more restricted in area and intensity to the wrists. The color varies in different individuals with the color of the upperparts.

In most middle-aged and old examples of both sexes, but especially in males, the front edge of the upper arm and shoulder is strongly varied with long grayish-white hair-tips, which are usually absent or only incipiently developed in full-grown young males and in the younger adult females. In some specimens the hair tips are not lighter than the adjoining coloration and the fringe of coarse hair is consequently much less conspicuous. The inside of the fore limbs is well clothed with whitish-tipped hairs of nearly the same color as the lighter portions of the underparts. The hands are usually deep black as far proximally as the pollex, sometimes nearly to the wrist. The extent of the blackish area and its intensity varies widely in different individuals and is always more extended proximally than on the feet.

6. Hind Limbs.—The hind limbs externally, including the thighs, are usually colored like the lower back, and are thus much paler than the fore limbs. The color is often widely different in different individuals of the same sex and age. The inside of the hind limbs is usually grayish white, rather lighter than the general tone of the underparts, with, in many specimens, the inside of the thighs ashy or smoky gray. In highly colored specimens the feet are intense black like the hands, the black extending nearly to the proximal end of the metatarsals. In dull-colored individuals the feet are blackish-brown varied strongly with gray proximally and on the outside.

7. Tail.—The tail may be described in general terms as black or blackish brown above, varied on the sides with light-tipped hairs; median lower surface often much lighter than the upper or sides. The variations in the color of the tail are not closely correlated with those of the limbs and body. In many individuals the proximal three or four inches agree in color with the adjoining part of the back. In others the entire tail is deep black from base to tip. In many others the apical half or two-thirds is black, the rest dull brownish black, or the sides and below lightened with grayish or reddish tipped hairs. In exceptional instances the tail is dull reddish brown throughout; the apical or basal portion only, or both, may be reddish and the mid-portion blackish.

IMMATURE PELAGES.—The Akenge series includes two specimens taken when only a few weeks old, and others from Niapu and Faradje illustrate older stages up to and including young adults that have acquired all the permanent teeth but still retain features of immaturity in pelage.

In the youngest specimen (No. 52258, ♂, Akenge) none of the teeth had broken through the gum. Greatest length of skull, 57.3 mm.; condylobasal length, 36.2; occipitonasal length, 55.3; length of braincase, 56.2; breadth of braincase, 44.2. (There are no field measurements.) Sides and whole upper surface of head black, the hairs of the front and sides minutely tipped with white; a broad median dorsal area from occiput to behind shoulders black, the hairs of the nape almost imperceptibly tipped with white; rest of the upperparts, from shoulders to proximal fifth of tail gray, the pelage blackish at base with long white tips; underparts thinly clothed with short, soft, creamy white hairs; inside of limbs like underside of body; outside of limbs grizzled dark brown and white, the hairs dark basally with long white tips; tail above like outside of limbs; tail below like inside of limbs and ventral area.

In the next (No. 52274, ♀, Akenge), a few days older, the lower incisors are half up and the two middle upper incisors have pierced the gums. Greatest length of skull, 62.0; condylobasal length, 37.6; occipitonasal, 59.7; length of braincase, 41.1; breadth of braincese, 46.7. Field measurements: Total length, 440; head and body, 200; tail vertebræ, 240; hind foot, 73. In this specimen the pelage is much longer on the upperparts but the underparts are nearly naked. The color pattern is the same as in the preceding (No. 52258) but the tones are much different. What is the blackish area in the other (head, nape and median foreback) is reddish brown in this specimen and extends medially to the sacral region; pelage of sides and rump dark brown basally, frosted with minute white tips, longer on lower back and thighs. Limbs and tail nearly as in No. 52258 but hair much longer.

A third specimen (No. 52328, ♀, Faradje) is still older, the milk incisors and the first tooth of the premolar series being nearly full-grown. Greatest length of skull, 65.2; condylobasal, 44.4; occipitonasal, 54.3; length of braincase, 61.0; breadth of braincase, 49.8. Field measurements: Total length, 505; head and body, 219; tail vertebræ, 286; hind foot, 89. Similar in color pattern to No. 52374, but pelage longer and color tones paler, the head, nape and foreback nearer hair brown, the basal portion of the pelage near cinnamon drab; base of hairs on outside of fore limbs and upper surface of tail also much lighter; outside of hind limbs pale yellowish white, darkening at base to about smoke-gray.

The next specimen in the series (No. 52309, ♀, Faradje) is much older, but lacks skull and field measurements. It still retains some of the first pelage, but the greater part has been renewed. It differs only slightly in the general character of the pelage from Nos. 52314 and 52318, next to be described, but the coloration of the dark parts is decidedly darker.

No. 52314, ♂, Faradje, is in second pelage, which is long and soft. Greatest length of skull, 76.0; condylobasal length, 53.4; occipitonasal length, 71.9; length of braincase, 64.2; breadth of braincase, 53.4. (No field measurements.) Mature milk dentition; crown of first permanent molar in both jaws above alveoli. A narrow black eyebrow band. Top of head, nape and shoulders dark raw umber (tone 4), much paler on lower back and upper surface of proximal two-thirds of tail; outside of fore limbs snuff-brown; outside of hind limbs of same general color but much lighter; underparts, inside of fore and hind limbs and underside of tail pale yellowish white or light putty color with a smoke-gray tinge on foreneck and chest.

No. 52318, Faradje. (No field measurements, and sex not indicated.) Head (except crown), nape and foreback light raw umber (tone 2; crown, tone 1); outside of fore and hind limbs (including hands and feet) dark putty color, but hind limbs a lighter tone than fore limbs; tail above and on sides light snuff-brown (tone 1); underparts, inside of limbs and underside of tail light chamois (tone 1).

No. 52344, ♀, Niapu. About half grown. (Skull lost.) Field measurements: Total length, 765; head and body, 293; tail vertebræ, 472; hind foot, 113. General coloration as in No. 52318, but tones rather stronger on upperparts and paler on underparts. Crown dark raw umber (tone 4); outside of fore limbs dark gray, hands grizzled with black; outside of hind limbs medium putty color, feet light gray slightly varied with blackish; proximal third of tail above dark reddish brown, rest of tail light fawn, slightly toned with blackish hair tips; lower side of tail lighter, but many shades darker than inside of limbs or underparts. Tuft of long hairs at each side of base of tail light fawn (tone 2).

The long hairs originating at the front base of the callosities as a pointed drooping tuft are well developed in even quite young specimens, and are at their highest development in older specimens just after the seasonal renewal of the pelage. In adults they are usually inconspicuous, but an examination of the pelage in front of the callosities shows that their apparent absence is due to wear, only the basal part remaining as a thick tuft of short, rather stiff hairs with abraded ends, slightly overlapping the upper edge of the callosities. In many young adults in fresh coat these tufts are as well developed as Rochebrune depicted for *Colobus tholloni* (cf. 1887, 'Faune de la Sénégambie,' Suppl. aux Vertébrés, fasc. 1, p. 110, Pl. v).

In young adults the pelage of the upperparts usually lacks the vermiculated tips commonly present in adults, in which it is often a conspicuous feature. The hands and feet are colored like the fore arms and lower legs until after the adult conditions of pelage have been fully acquired, when the blackening of the upper surface of hands and feet begins gradually to appear, differing in extent and in intensity in different individuals, independently of sex.

Colobus powelli brunneus Lönnberg

Plates CV, Figure 2; CVI; CXXII–CXXXI

Colobus (*Piliocolobus*) *brunneus* Lönnberg, 1919, Rev. Zool. Africaine, VII, pp. 112–115; part, type only. Type locality, "Sili in the 'district du Haut-Uele.'" Type specimen, a skin with skull (sex not indicated, but its size indicates a male). The two specimens from Buta (in the same general region to the southwest of Sili), identified with it by the author, should doubtless be referred to it. The specimen from Mokoko[1] (between Penge and Irumu) should be referred to the subspecies *powelli*, as indicated by the locality and its brighter color tones.

?*Colobus* (*Tropicolobus*) *schubotzi* Matschie, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 345 (in text). Type locality, "Koloka zwischen dem zum Rubi-Itimbiri fliessenden Likati." Skin only. A brief preliminary notice, to be followed later by a fuller description, as yet apparently not published.

Represented by 42 specimens, accompanied by 3 skeletons, collected as follows:

Bafuka, 2 (adult ♂, skin and complete skeleton, and an additional ♂ skull), March 11, 1913.

Faradje, 40 (all adult but 5, nearly all skins with skulls, 17 with field measurements), June 23, July 16, 22, 23, November 23–December 3, 1911; December 2, 3, 1913.

The external measurements—average (minimum-maximum)—of fifteen adults of *Colobus powelli brunneus*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
10 ♂	1295(1215–1335)	582(525–610)	714(633–785)	191(180–200)	40(38–42)
5 ♀	1268(1225–1315)	559(510–585)	709(650–750)	189(183–203)	39(35–42)

The cranial measurements—average (minimum-maximum)—of twenty-nine adults of *Colobus powelli brunneus* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
17 ♂	118.7(112.2–130.7)	97.0(92.3–107.7)	96.3(91.6–103.5)	91.1(86.8–97.4)
12 ♀	104.1(97.8–109.7)	85.7(81.7– 88.4)	86.2(80.1– 92.1)	76.3(70.3–81.0)

	Orbital Breadth	Interorb. Breadth	Postorb. Breadth	Braincase Breadth
17 ♂	71.7(65.5–77.7)	10.9(8.6–12.5)	41.1(38.0–45.2)	60.7(57.8–66.0)
12 ♀	63.1(60.4–66.1)	9.5(8.8–11.3)	41.0(39.2–43.7)	57.9(52.3–62.1)

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[1] [The collector, Dr. J. Bequaert, informs me that the locality is Mokoko. In the original description spelled by error "Muhako."—H. L.]

	Mastoid Breadth	Upper Toothrow	Upper Molars	Sagittal Crest
17 ♂	69.9(63.5–76.4)	41.2(38.0–45.5)	21.3(19.7–23.4)	5.4(2.5–8.4)
12 ♀	61.4(52.0–67.3)	36.7(34.2–39.1)	20.6(19.2–22.2)	

The Faradje-Bafuka series, from the forest galleries of the veldt district, represents a form of *powelli* strongly differentiated from that of the Rain Forest, and characterized by markedly paler coloration, as noted above under *C. powelli* (p. 445). Two average specimens from Faradje may be described as follows:

Male (No. 52306).—Head with a narrow black frontal band extending posteriorly about two-thirds the distance to the front base of ears; tufts of long hair in front of ears blackish, conspicuously annulated subapically with light mineral brown, in part also with the same tone on basal half; the whorl of softer hair behind ears pale yellowish white, lighter at tips and darker (nearly chamois) at base; sides of head grizzled dull blackish brown passing below into pale creamy white; crown and occiput madder brown. Nape and shoulders dark chocolate in general effect, the hairs individually smoke gray at base shading to pinkish drab, the apical fourth darkening to blackish brown minutely tipped with pale chocolate; foreback like shoulders but less heavily toned with dark brown; lower back and rump dark fawn in general tone, strongly vermiculated with pale snuff brown. Upper arm proximally similar to back but much paler, the long hair in front of shoulders with long pale yellowish white tips; lower arm pale yellowish gray superficially, the hairs slate gray for the basal two-thirds; hands dark brownish black nearly to wrist. Hind limbs much paler than fore limbs (about putty color); feet much paler than hands, the dusky portion not extending proximally beyond base of hallux. Tail above and laterally grizzled with dusky, underside like the hind limbs. Chin and throat nearly naked, with short scattered silvery white hairs. Foreneck, chest and whole abdominal area yellowish white darkened slightly on chest and more yellowish toward lateral edges; inside of both fore and hind limbs more whitish and less yellowish than the ventral area; laterally at base of tail and anal region a deeper tone prevailing (about pale yellowish buff).

Male (No. 52311).—Like the male above described, but all the color tones decidedly paler, particularly on the head and upperparts; below and on inside of limbs the yellowish tone is everywhere much stronger, including especially the long hairs of the lateral line. The pelage of the underparts is also everywhere thicker and longer except on the inside of thighs and inguinal regions which are nearly naked; chin and throat well clothed.

From the above average specimens the variations are, in extreme examples, toward a more dusky tone superficially on the upperparts on the one hand and to a more reddish tone on the other, varying to yellowish buff or even deep cinnamon. The prevailing color of the upper surface of the tail varies from blackish brown to a distinctly reddish tone, especially on the apical third; in only one specimen is the tail mainly black—blackish with a reddish tone on the basal third, thence wholly black to the tip.

Subadult specimens are usually paler than adults; they also lack the pale vermiculation of the dorsal area present in adults of both sexes.

The skin from Bafuka (No. 52287), an old male, may be regarded as practically a topotype of *brunneus*, the type locality, Sili, being about 60 miles southwest from Bafuka. This specimen agrees perfectly with the description of the type of *brunneus*. It is however a little darker than average males from Faradje, but is almost indistinguishable from some of the darker examples. Probably a large series of specimens from Bafuka would average very nearly like the large Faradje series.

The Faradje series parallels the *powelli* series from the Rain Forest in the range of individual variation in coloration, size, and cranial characters, and duplicates it in nearly all respects except in the color tones, which contrast strongly, the most richly colored specimens from Faradje scarcely equalling the dullest and palest of those from Akenge and Niapu. It seems therefore quite unnecessary to go into the details of individual variation in the Faradje series, which would be a repetition of what has already been given above under *powelli*, with a slightly different terminology for color tones.

As Lönnberg (*loc. cit.*) has suggested, his *brunneus* may be the same as *schubotzi* of Matschie (*loc. cit.*), the latter merely indicated very briefly from a single skin collected near the mouth of the Likati River, southwest of the type locality of *brunneus* in practically the same environment. Although the name *schubotzi* has four years priority over *brunneus*, it rests entirely upon the locality given for it, as the few words of description have no significance. So far as any characters are at present available, the name should be treated as indeterminate until it has been established on the basis of adequate topotypic material.

Colobus powelli brunneus differs from *C. p. powelli* not only in coloration (as already indicated) but averages slightly larger in both external and cranial measurements, especially in the latter. In 17 adult male skulls of *brunneus* of the Faradje series the average greatest length, condylo-basal length and zygomatic breadth exceeds that of 13 adult male skulls of *powelli* from Akenge by 5.5 mm. in each of these measurements, with all the other cranial measurements correspondingly larger. Besides this a sagittal crest is present in all male skulls of the Faradje series, varying in height from 2.5 to 8.4 mm., averaging 5.4 mm. A sagittal crest is present in only 8 males of the Akenge series, it being wholly absent in the other 5. It ranges in height from 2.3 to 7.2 mm., averaging 4.1. The condition of skulls and teeth, however, indicates greater average age in the Faradje series than in the Akenge. This factor would account in a measure for the stronger development of the sagittal crest, and possibly to some extent for the larger average size. In the Faradje series about half of the skulls have the teeth greatly worn and the other half slightly worn. In the Akenge series only one-third have the teeth greatly worn, the other two-thirds showing little or no wear. As, however, skulls with greatly worn teeth are usually not the largest in either series, and as the largest skulls in both have practically unworn teeth, the element of age should not be given too much importance as the determining factor in the averages of size in these two series.

The females of *brunneus* and *powelli*, on the basis of 12 skulls of the former from Faradje and 10 of the latter from Akenge, differ almost inappreciably in size, with a slightly greater average for *brunneus*. In this case the skulls of the two series are strictly comparable as to age. Again it is found that the largest skulls of the series are among the youngest, and that the smallest are usually the oldest.

The measurements given above for these two forms (see p. 445 for *powelli* and p. 453 for *brunneus*) are worthy of careful study from the viewpoint of purely individual variation. There is a wide range of difference in the size of different specimens of the same sex from the same locality, and a great irregularity in variation of the same parts of the skull in skulls approximately alike in general size. This is interesting from the viewpoint of the bearing of such divergencies on their availability as diagnostic characters in the case of forms based on single specimens (Pls. CXII–CXXXI).

NOMENCLATURE OF *Colobus powelli* GROUP

At least ten described forms of *Colobus* must be carefully considered in determining the proper technical names of the red *Colobi* in the American Museum collection from the Upper Congo. The first name involved, in the order of priority, is *Colobus tephrosceles* Elliot (1907),[1] based on three specimens "procured by Sir H. H. Johnston on the Ruahara River, district of Toro, on the east side of Mount Ruwenzori at an altitude of 4000 feet." The description agrees satisfactorily with specimens in the present collection from Akenge and Niapu, *including the sides of the head*, described as "blackish gray" (not *red* as in *C. ellioti*). As noted below, five other forms were described in 1913 and 1914 from the adjoining eastern border of the Ituri Forest, some of them from quite near the western base of Mount Ruwenzori, with apparently no serious physical barrier (only the Semliki River) between the type region of *C. tephrosceles* and the type localities of the other five, and with no essential difference in the supposed diagnostic characters of these proposed species.

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[1] 1907, Ann. Mag. Nat. Hist., (7) XX, September, p. 195. Type, a skin without skull, from Toro, Uganda. In this description the measurements of the skull were, by a "misunderstanding," taken from "the skull of another species." (Cf. Elliot, 1913, 'Rev. Primates,' III, (1912), p. 125, footnote.) *Colobus tephrosceles* Elliot, *loc. cit.*, pp. 124–125, Pl. xv (skull). Correct measurements of a male topotype skull supplied.

The next in order of date is *Colobus ellioti* Dollman,[1] based on a skin, without skull, from a locality 90 kilometers west of the south end of Lake Albert Edward. The typical phase of *C. ellioti* is, however, quite different from *C. tephrosceles*, and also from the five supposed forms of red *Colobi* from the Upper Ituri district, all of which live in a region of distinctly different environment. *C. ellioti*, on the other hand, seems closely related to the *C. foai-tholloni* group. It ranges north nearly or quite to the Lower Ituri, the only specimen in the present collection being from Avakubi. As stated above (p. 444) this specimen is so nearly identical in coloration with the description of the type that no differences are appreciable between it and the type. No other specimen suggesting near relationship to *ellioti* was obtained among the series of more than forty specimens collected at Avakubi and thence northward to Akenge, nor in the equally large series from Faradje. Matschie[2] has recorded a series of thirty-three specimens collected by Powell-Cotton on the road between Avakubi and Mawambi and thence eastward toward Beni as "*Colobus* (*Piliocolobus*) *ellioti*," which would seem to indicate that it is a common species for some distance eastward from Avakubi. In his remarks on the variability of the series as regards their general coloration he makes no reference to red color on the sides of the head, and on the following page describes his "*Colobus* (*Piliocolobus*) *powelli*" from specimens collected between Mahagi and Irumu, some distance to the northeastward, as having the cheeks gray and the back orange-ocher, in contradistinction from the *ellioti-foai-tholloni* group.

Lorenz in 1914[3] reported on a series of more than thirty specimens collected in the Ituri Forest by Grauer. This series he made the basis of a new species, *Colobus variabilis*, without designating a type specimen. He considered it a member of the subgenus *Tropicolobus*, on account of its red coloration and the erect hair-tufts behind the ears. He says the series shows great variation in coloration and yet is so fully blended that all must be regarded as belonging to a single species. In describing the color variations he divides the series into four groups, *a*, *b*, *c*, *d*. His detailed account indicates its near resemblance to *Colobus ellioti*. He also described a second species, *Colobus multicolor*, represented by a single specimen from Mawambi, which he says also belongs to the subgenus *Tropicolobus*, but differs from the *variabilis* series through its strikingly varied coloring, particularly by the presence of a sprinkling of whitish on the nape, foreback and shoulders,—in all probability an individual differentiation, not to be seriously considered.

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[1] 1909, Ann. Mag. Nat. Hist., (8) IV, November, pp. 475–476. Redescribed from the same specimen, with a colored figure, by Elliot in 1913 ('Rev. Primates,' III, (1912), pp. 126–127, Pl. v, animal).

[2] 1913, Ann. Soc. Zool. et Malacol. de Belgique, XLVII, (1912), August, pp. 58–61.

[3] 1914, 'Einige neue Stummelaffen von Innerafrika aus der Sammlung R. Grauer's,' Anz. Ak. Wiss. Math. Nat. Kl. Wien, LI, July, pp. 383–386.

In a later paper Lorenz,[1] after receiving still more material from the same general region, reached the conclusion that not only his *Colobus variabilis* but also other forms described from the Upper Ituri district should be referred to *C. ellioti* as synonyms, having been based on phases of individual variation. Among these are *Piliocolobus ellioti melanochir* and *Piliocolobus anzeliusi* of Matschie (1914).

Lönnberg in a paper on the monkeys of the Upper Congo published two years later[2] also gave a list of twenty-eight specimens from nearly the same district (most of them collected by Christy) which he refers to "*Colobus* (*Piliocolobus*) *ellioti*." He says, referring to Lorenz, that "he [Lorenz] regards not only *melanochir*, but also *anzeliusi* Matschie and *variabilis* Lorenz as synonyms of *ellioti*. I agree fully with him in this respect, but I think that still more names could be added to this list, among others *multicolor* Lorenz" (*loc. cit.*, p. 110).

Lönnberg, two years earlier,[3] had described a series of six specimens of a red *Colobus* from the vicinity of Beni and Rutshuru River, near the western border of the Ituri Forest, which he referred also to *Colobus ellioti*, with extended comment (*loc. cit.*, p. 31) on the great variability of this small series from a single locality, and the bearing of this variability in relation to other alleged forms. He sums up his descriptions of these specimens by saying "that no two specimens are fully alike," and adds: "The extremely great variability of these red *Colobi*, as set forth in Lorenz's papers as well as in this one, and the fact that *Colobus ellioti* was described on insufficient material, has caused the confusion, which now, as it may be hoped, is removed. On the other hand, however, this great variation is of deep interest, and it ought to be considered in connection with several other striking proofs of variation which are elucidated in this paper."

In the absence of comparable material for direct comparison it seems probable that all of the forms referred to above, except the first (*Colobus

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[1] 1917, 'Beitrag zur Kenntnis der Affen und Halbaffen von Zentralafrika.' Ann. Naturhist. Hofmus. Wien, XXXI, pp. 169–241, Pls. VII–XV, text figs. 1–5.

[2] 1919, 'Contributions to the knowledge about the Monkeys of Belgian Congo.' Rev. Zool. Africaine, VII, pp. 107–154. *Colobus ellioti*, pp. 108–110.

[3] 1917, 'Mammals collected in Central Africa by Captain E. Arrhenius.' Kungl. Sven. Vetensk. Handl., Stockholm, LVIII, No. 2, September, pp. 1–110, Pls. I–XII, text figs. 1–11.

tephrosceles) should be assigned to *ellioti*, as has already been done by Lönnberg and Lorenz; either as synonyms or as local forms, especially those based on specimens from the eastern border of the Ituri district, which seem to differ somewhat from the type form of *ellioti* from the upper Lindi River. As said above only a single specimen in the present collection, from Avakubi, is referable to this group. Another name must consequently be sought for the large series of specimens from collecting stations north of Avakubi. The earliest name for any form of this group, which ranges from the Uganda forests westward to the Uele drainage, is apparently, as already mentioned, *Colobus tephrosceles* Elliot (1907), from the eastern base of Mount Ruwenzori. This name, in the absence of specimens for examination, seems, from geographical considerations, not entirely satisfactory. *Colobus powelli* Matschie (1913), based on specimens from Zokwa, between Mahagi and Irumu, is the next name in order of date, and for this reason has been provisionally accepted for the present series from the Avakubi-Niapu-Akenge district, about three degrees west of Zokwa in the Rain Forest. Absence of material from the Ituri district for direct comparison with that from Niapu and Akenge renders this an unsatisfactory decision, but the alternative to its acceptance is to give a new name, which seems extremely undesirable until the status of the numerous supposed forms involved has been definitively established. It is quite possible that *Colobus tephrosceles* will be found to extend far westward from its type locality, and that the forms recognized above as *Colobus powelli powelli* and *C. p. brunneus* will prove to be geographically related forms of *C. tephrosceles*.

Twenty forms of the red *Colobus* group have been described from the Belgian Congo. Fourteen of them were based on single specimens, nearly half of them on the skin alone, in two instances on only a mutilated skin. One (*C. powelli*) was based on a series of seven skins with skulls; in several other cases two or three specimens were available but the cotypes were immature, the permanent dentition being incomplete. Hence it follows that the descriptions were in most instances merely based on single specimens in a group now known to be extraordinarily subject to individual variation, and not on descriptions of species or of even geographical forms. The type localities of seven of these supposed species are within an area about 120 miles square in the Ituri Forest district; four others are in the upper drainage of the Lualaba River, and four more from the district of Lake Leopold II. These forms (most of them described as species) are admitted by their describers to be closely affiliated to the *Colobus-foai-ellioti-tholloni* group. It is quite probable that some of them may represent local races, while many doubtless will eventually be relegated to synonymy. Their real value can be determined only by comparison of topotypical series of each form. When most of them were described little was known of sexual differentiation in these groups, or of differences due to immaturity, and almost nothing of the range of individual color variations, now found to be exceptionally great wherever series of specimens from the same locality have been available for comparison.

Colobus abyssinicus ituricus Matschie

Plates CVII; CVIII; CIX, Figure 2; CXXXII-CXLI

Colobus (*Guereza*) *matschiei ituricus* MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 48. "Ituri." Type, an adult male, skin with skull, without definite locality, collected by Anzélius. Also six cotypes, Powell-Cotton collection, from near Mawambi, mostly from between Mawambi and Irumu, Ituri forest, Belgian Congo.

?*Colobus* (*Guereza*) *matschiei uellensis* MATSCHIE, 1913, *loc. cit.*, p. 47. Type (and only specimen mentioned), an adult female (skin mounted, skull separate), from "Uelle," without definite locality. Polidori collection, Musée du Congo belge.

Colobus occidentalis ituricus LORENZ (not *C. matschiei ituricus* Matschie), 1914, Anz. Ak.Wiss. Wien, Math.-Nat. Kl., LI, November, p. 508. Eastern border of Ituri forest near Mawambi. Nine specimens, Grauer collection. No type indicated.

Colobus occidentalis LÖNNBERG, 1919, Rev. Zool. Africaine, VII, October, pp. 117–118. Twenty-two specimens listed, with their respective localities and collectors, from the Ituri forest and Uele district, followed by comment, which includes the following: "In spite of the fact the [=that?] several names have been given to Guerezas from various parts of the Congo forest, I venture to include all these specimens under the above name."

Represented by 49 specimens accompanied by 5 skeletons, collected as follows:

Bafuka, 1 (subadult ♀), March 10, 1913.

Yakuluku, 2 (2 ♀, 1 adult, 1 young), September 30, 1911.

Faradje, 38 (26 adults, the sexes about equally represented; skins with skulls, 5 with skeletons; also 4 embryos in spirits, and 8 in various stages of immaturity; all but 1 with field measurements), February 5, 14–18, 28, March 9, 14, April 27, September 12, December 4–10, 1911; October 26–31, 1912.

Vankerckhovenville, 1 (young ♀), April 18, 1912.

Avakubi, 7 (6 adult ♂ and 1 young ♀; 1 with skeleton; all with field measurements), September 1, 10, November 3, 25, December 21, 1913; February 23, 1914.

The external measurements—average (minimum-maximum)—of twenty-nine adults of *Colobus abyssinicus iturìcus*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
16 ♂	1405(1270–1550)	593(535–690)	811(670–885)	191(175–207)	44(37–50)
13 ♀	1325(1235–1410)	554(485–640)	773(715–825)	179(165–190)	40(35–43)

The cranial measurements—average (minimum-maximum)—of thirty adults of *Colobus abyssinicus ituricus* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
17 ♂	116.0(104.4–126.3)	99.8(87.0–110.3)	92.6(84.6–96.5)
13 ♀	107.2(104.0–114.4)	92.3(84.9– 97.3)	87.3(82.4–94.6)

	Zygomatic Breadth	Orbital Breadth	Interorb. Breadth	Postorb. Constr.
17 ♂	81.2(70.4–88.5)	68.0(59.4–73.4)	10.6(8.3–12.8)	44.8(42.3–47.8)
13 ♀	76.7(71.2–83.5)	65.4(61.2–69.7)	10.7(9.7–11.7)	44.2(42.3–46.5)

	Braincase Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
17 ♂	60.6(55.5–66.7)	67.1(59.6–77.3)	41.0(37.2–47.5)	21.3(20.0–22.6)
13 ♀	57.8(55.3–61.5)	62.6(58.4–69.2)	37.7(34.5–39.5)	20.5(19.2–21.4)

Age Variation.—The above cranial measurements are based only on specimens that have acquired fully developed permanent dentition, including canines as well as cheek-teeth. While there is a wide range of variation in external as well as in cranial measurements, only a small part of the difference in size is attributable to age, since some of the smallest members of the series are shown by the teeth and skull to be well advanced in age, while some of the largest have the teeth practically unworn, and the skull indicates comparative youthfulness.

Sexual Variation.—Females average considerably smaller than males, yet some females exceed some males in size, even where both are strictly comparable in respect to age. The canines in females are of the same relative length and size as in males, thus differing from those of females in the *Colobus powelli* group, in which the canines are relatively much shorter and less massive than in males.

A sagittal crest appears to be rarely developed, even in males, in the present species. The parietal ridges are much less developed in females, and even in old age have a lower position on the skull. In old males the parietal ridges move up to near the median line, forming posteriorly a broad flat ridge without a distinct median crest, in one specimen narrowing to a breadth of slightly less than 3 mm., with a height above the plane of the braincase of about 1 mm., and a length of about 11 mm. (Pls. CXXXII, fig. 1; CXXXIV, fig. 1; CXXXIX, fig. 1). In two other old male skulls the parietal ridges are joined for about 5 to 7 mm. into a narrow flat plate with an indistinct median crest posteriorly. In these specimens the lambdoidal crest is strongly developed and all the cranial sutures are obliterated.

In seven male skulls with the basal suture closed the average greatest length of the skulls is 119.9 mm., the extremes being 115.6 and 126.3. In ten skulls with the basal suture still open the average greatest length of the skull is 113.3, the extremes being 104.4 and 121.8. The zygomatic breadth in the same seven skulls with closed basal suture is 84.7, the extremes being 79.2 and 88.5. In the ten skulls with the basal suture open the zygomatic breadth averages 77.7 mm., the extremes being 70.4 and 83.6 mm. In the series of seven older skulls the greatest length is 120 mm. or more in three of them; in the series of ten younger skulls only three slightly exceed 120 mm. The average difference of the two series is about 6 mm. in greatest length and about 7 mm. in zygomatic breadth, probably due in part to the difference in age of the two series. The individual range in the older series is 11 mm. for greatest length and 9 mm. for zygomatic breadth. The individual range in the younger series is 17 mm. for greatest length and 13 mm. for zygomatic breadth.

The thirteen adult female skulls of the present series, all from a single locality, are of special interest for comparison with the statistics of size given above for the males. In eight of them the basal suture is fully obliterated, and in the other five it remains open. The average greatest length of the skull is slightly greater in the younger series, being in the older series 106 mm., in the younger series 109, or 3 mm. greater; the average zygomatic breadth is the same in both, 77 mm. Age has in the females little influence upon size, in striking contrast with what has been shown above to be the case with males.

The range of individual variation in the greatest length in the older series of eight is 7 mm. and in the younger series of five, 10 mm. The variation in zygomatic breadth is 10 mm. for the older series and 12.3 for the younger, or, respectively, 9.5 and 11 per cent of the average. In other words, the skull in females reaches its maximum size with the complete development of the permanent dentition, while in males the skull does not attain the maximum till a much later period. The skull in the female increases in weight and strength after it has reached its full linear dimensions by denser ossification, and develops also strong parietal ridges, greatly resembling those of males.

Individual Variation in Cranial Characters.—A feature of individual variation in both males and females, not only in the present species but of very general occurrence, is the relative convexity and stoutness of the zygomatic arch in specimens otherwise quite similar and of strictly comparable age. In some of the skulls in the present series of *Colobus* monkeys the zygomatic arch is only slightly expanded and weak in structure, in others greatly and evenly arched outward and heavily ossified. Attention is called to this striking feature of individual variation for the reason that it is often seized upon as of weighty significance as a diagnostic character in distinguishing local forms, and sometimes species, especially when describers are dealing with limited material. Its value as a distinctive character should be confirmed by reference to more than a single specimen. This feature is often greatly influenced by the age of the individual, as the malar arch often changes much with age, being usually, or at least frequently, weaker and flatter in young adults than in old adults.

Other exceedingly variable features, not indicated by the above cranial measurements, are the size and form of the external nares and the size and shape of the nasal bones. They are so obviously of no diagnostic value that it has not been deemed worth while to include them in the series of cranial measurements. Yet it seems proper to recall that describers often regard them as important distinctive features for the discrimination of closely allied forms. Like other features of size and form, attentive study of large series of specimens from a single locality is convincing of their unavailability as diagnostic characters.

INDIVIDUAL VARIATION IN SIZE.—The external measurements from specimens in the flesh (p. 460) hardly require special comment; they are sufficient to call attention to the range of variation in size and relative proportions.

INDIVIDUAL VARIATION IN COLORATION.—The present series of 50 specimens of the white-mantled *Colobus* was taken in two small areas, the greater part at Faradje, a few at Avakubi. Although these two collecting stations differ somewhat in environmental conditions, which often give rise to local forms in other groups, there seem to be no recognizable features of differentiation, either in color, in markings or in size. There is, however, considerable individual variation in certain features of coloration.

The color pattern consists of sharply contrasting areas of black and white. The variations affect merely the relative extent of these areas. The white areas are as follows: (1) A narrow white frontal band, which merges posteriorly with the white of the sides of the face below the ears, and is continuous with the white of the throat and foreneck; (2) a mantle of very long white hair on the lower back, which extends posteriorly to the base of the tail and joins the broad band of short white hair enclosing the callosities laterally and below, and also extending forward along the sides of the body to the shoulders.

Variations from the average condition occur in the breadth of the frontal band, in which the extremes vary from 30 to 50 per cent of the mean. Also in a few individuals the narrow line of white above the base of the ears is either absent or represented by a few short, inconspicuous white hairs. The lateral band of long white hairs is separated from the white of the sides of the neck by about 25 to 50 mm. of solid black; this space is reduced in a few instances to about 15 mm. Occasionally there are a few (in some instances many) scattered long, coarse white hairs in front of the shoulders on either side of the median line. There are similar scattered white hairs on the thighs, varying in abundance in different specimens and often entirely absent. The length of the long hair forming the mantle varies greatly in different individuals. The perineal patch of thick, short, white hair enclosing the callosities varies greatly in extent (from 25 to 60 mm. on the median line below them), and is relatively much smaller in females than in males. The relative length of the white terminal portion of the tail, and of the tuft beyond the vertebræ, is exceedingly variable. The white apical part is usually separated from the black proximal portion by a narrow space of gray, varying in length from less than 25 mm. to more than 75. At the point of junction, the white and black sometimes meet evenly entirely around the tail; usually the white or grayish white extends further proximally on the lower side of the tail than on the upper, varying in different individuals from 25 to 75 mm. or more. The white portion of the tail varies in length relatively to the black part, due partly to the condition of the pelage. In specimens with a thin, short brush the tips of the hairs show unmistakable abrasion. The white portion of the tail (to the end of the hair) varies in length from about one-fourth to about one-third of the entire length of the tail. The tuft at the end varies also from one-third to one-fourth of the length of the white portion. The white of the tail is usually not pure white, like the white of the mantle and sides of the body, but more or less brownish white, evidently due mainly to adventitious staining. The stain is greater in individuals with worn pelage than in those with a fresher coat. In many instances the brownish white stain is limited to the apical half or two-thirds of the hairs, the basal part being usually white, especially in specimens in unworn pelage. Also it is to be noted that the forest (Avakubi) specimens have the tail whiter (less stained) than the specimens from the forest galleries of the Savannah region (Faradje). There are no other appreciable differences between the specimens of the two localities.

Immature Pelage.—Seven of the Faradje series are very young specimens, of which four are in the first, or natal, coat; the other three have fully assumed adult coloration. The youngest (No. 52242, ♂ juvenile, December 10, 1911) measured in the flesh: Total length, 580 mm.; head and body, 225; tail vertebræ, 355; hind foot, 94; ear, 31. Greatest length of skull, 66.7; occipitonasal length, 63.0; condylobasal length, 40.5; zygomatic breadth, 39.0; breadth of braincase, 51.2; mastoid breadth, 40.0. The two middle upper incisors are fully developed but the canines and cheek-teeth are just breaking through the gums. The pelage is short, soft. conspicuously wavy, and wholly white, including limbs and tail. It is thick on the entire upperparts, with a length of about 15 to 17 mm. on the middle of the back; the underparts are scantily covered, the pale yellow skin showing through. On the proximal two-thirds of the tail the hairs are short but increase greatly in length on the apical third, with a terminal tuft extending 25 mm. beyond the vertebræ. The skin on the body is everywhere pale yellow, except for grayish on the outside of the limbs and for a short distance on the upper side of the tail at the beginning of the proximal third.

A slightly older specimen (No. 52239, ♂ juvenile, December 4, 1911) still retains the natal pelage on the body and limbs, but the feet and hands, a small spot on the crown and the apical third of the tail are mixed blackish brown and white, black greatly prevailing on the hands, feet and apical third of the tail. The pelage is soft, wavy, and creamy white on the body and proximal two-thirds of the limbs and tail, and of the same texture as the somewhat younger specimen described above; the dark hairs on the distal portion of the limbs and tail are coarser and more bristly, belonging evidently to the incoming second pelage. This specimen measured in the flesh as follows: Total length, 590 mm.; head and body, 236; hind foot, 87; ear, 34. Greatest length of skull, 74.4; occipitonasal length, 71.0; condylobasal length, 51.4; zygomatic breadth, 41.0; breadth of braincase, 57.3; mastoid breadth, 46.4. In this specimen the milk dentition is fully developed.

In the next stage (represented by No. 52224, ♀ juvenile, February 15, 1911), the natal coat has been entirely replaced by a pelage of mature texture and coloration, except that the white of the lower back is grayish white, owing to a strong mixture of hairs that are more or less blackish on the median third, the base and tip only being white. The white hair is much longer on the lower back and sides than on the adjoining black areas. The hair of the body, limbs and tail is as intensely black as in adults. This specimen, approximately about two and a half months old, measured in the flesh as follows: Total length, 620 mm.; head and body, 232; tail vertebræ, 388; hind foot, 100; ear, 30. Skull, greatest length, 76.4; occipitonasal, 66.4; condylobasal, 50.8; zygomatic breadth, 43.8; breadth of braincase, 51.5; mastoid breadth, 44.4. The full milk dentition is present but the last cheek-tooth is barely through the gum.

An older specimen (No. 52247, ♀ juvenile, October 27, 1912), probably about ten months old, is in perfect adult pelage, as regards texture, coloration, pattern of markings and proportional length of the long white hair of the mantle to the general pelage. The white at the tip of the tail is relatively much shorter than in adults, having a vertebral length of about 75 mm. and a total length to the end of the hairs of about 125 mm. This specimen has the complete deciduous dentition, and the first molar of the permanent set can be seen through an opening in the capsule. The flesh measurements are recorded as: Total length, 1060 mm.; head and body, 450; tail vertebræ, 610; hind foot, 140; ear, 41. Skull, greatest length, 72.3; condylobasal length, 51.3; zygomatic breadth, 47.2; mastoid breadth, 51.5. It hence appears that the mature characteristics of the pelage are attained long before any of the permanent teeth have pierced the gum, the milk teeth remaining functionally unimpaired. Other specimens of about the same age fully support this conclusion.

Another young female, taken at the same place and date, is smaller in external measurements but the skull is larger and more mature, as indicated by the contour of the frontal region and the presence of an almost fully developed first molar in addition to the full set of milk teeth. As in other examples of about the same age, the white tail-tip is relatively much shorter than in adults and not so white, the hairs being blackish or brownish for the greater part of their length and clear white for a short distance at the base.

Unfortunately there are no specimens representing the transition from the natal to the second pelage. The transition stages are, however, probably similar to those of *C. angolensis cottoni* described below (pp. 468–469).

Colobus angolensis cottoni Lydekker

Plates CIX, Figure 1; CX, CXI, CXLII-CLI; CLXVI, Figure 1

Colobus palliatus cottoni Lydekker, 1905, Ann. Mag. Nat. Hist., (7) XVI, October, p. 432. "Qugo" (lege Zokwa[1]), between Mahagi and Irumu, upper Ituri River, Belgian Congo. Type, a skin with skull, collected by Powell-Cotton.

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[1] "Qugo" is a misprint for Zokwa (cf. Matschie, 1913, Rev. Zool. Africaine, II, February, p. 204).

Colobus (Colobus) palliatus cottoni Matschie, 1913, Rev. Zool. Africaine, II, February 15, pp. 203–205. Comment on Lydekker's original specimens and on others collected by Powell-Cotton near the type locality.

Colobus cottoni Thomas, 1915, Ann. Mag. Nat. Hist., (8) XVI, December, p. 466. Poko, 1 (young).

Colobus (Colobus) palliatus mawambicus Matschie, 1913, Rev. Zool. Africaine, II, February 15, p. 205. Near "Nord Pemba, zwischen Irumu und Mawambi am oberen Ituri," Belgian Congo. Type, a young male, mounted in Tervueren Museum, skull separate. Also three cotypes, one an adult male topotype. Three of the specimens collected by Powell-Cotton, the other by Nahan, from Panga, on the Aruwimi.

Colobus mawambicus nahani Matschie, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 335. Panga, Aruwimi River, Belgian Congo. Type, adult female, previously a cotype of *Colobus palliatus mawambicus*.

Colobus palliatus mawambicus Lönnberg, 1919, Rev. Zool. Africaine, VII, October 1, p. 115. Comment on five specimens from Mawambi (Christy and Grauer collections).

Represented by 66 specimens accompanied by 4 skeletons, collected as follows:

Poko, 4 (2 ♂, 2 ♀—1 immature; only 1 with field measurements), August 1913.

Akenge, 23 (13 ♂, 10 ♀, of which 19 are adult; skins with skulls, with 3 complete skeletons; all but 3 with field measurements), September 29–October 28, 1913.

Niapu, 23 (11 ♂, 12 ♀, all skins and skulls, with field measurements; all but 4 adult), November 9–December 1, 1913.

Medje, 1 (young ♂), April 14, 1910.

Gamangui, 9 (5 ♂, 4 ♀, all but 1 adult; skins and skulls, including 1 skeleton; all with field measurements), January 31, February 1–20, 1910.

Avakubi, 3 (all adult ♂, skins and skulls, all with field measurements), April 14, 15, 1914.

Ukaturaka, 1 (skin only; no measurements), May 1909.

Also 2 flat skins without field data.

The external measurements—average (minimum-maximum)—of thirty-six adults of *Colobus angolensis cottoni*, taken from animals in the flesh, are as follows:

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
21 ♂	1405(1310–1470)	581(490–640)	824(720–890)	192(180–205)	44(39–46)
15 ♀	1361(1230–1470)	561(505–610)	800(645–880)	186(171–200)	41(37–45)

The cranial measurements—average (minimum-maximum)—of forty-two adults of *Colobus angolensis cottoni* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
25 ♂	114.0(105.3–122.8)	96.8(90.0–107.0)	92.6(87.2–99.3)
17 ♀	107.5(102.9–113.8)	88.8(78.5–94.9)	88.5(84.1–94.3)

	Zygomatic Breadth	Orbital Breadth	Interorb. Breadth	Postorb. Constr.
25 ♂	84.4(80.0–92.6)	71.2(67.0–81.2)	11.7(9.6–14.2)	42.3(40.3–47.0)
17 ♀	77.4(69.6–82.8)	65.5(59.3–72.0)	10.3(8.8–12.0)	43.9(41.5–46.4)

	Braincase Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
25 ♂	60.1(56.6–66.7)	69.3(63.5–74.5)	39.4(37.0–42.3)	20.8(19.0–22.5)
17 ♀	59.2(57.3–62.5)	63.5(59.3–69.0)	36.4(33.8–38.3)	20.0(18.2–21.2)

Immature Pelage.—The first, or natal pelage is represented by a single specimen (Pl. CXI, fig. 2) from Niapu (No. 52178, ♀ juvenile, November 12, 1913) taken with its mother (No. 52177). The entire pelage is white, soft and wavy, and in color and texture is indistinguishable from that of the young *Colobus abyssinicus ituricus* of corresponding age. The underparts are naked. The skin of the body and limbs (except hands and feet) is pale yellow and gives a creamy tone to the pelage. The flesh measurements are as follows: Total length, 490 mm.; head and body, 205; tail vertebræ, 285; hind foot, 79; ear, 31. Skull, greatest length, 64.3; occipitonasal length, 60.8; condylobasal length, 47.2; zygomatic breadth, 41.0; breadth of braincase, 48.5; mastoid breadth, 42.5. The milk dentition is just breaking through the gums.

Other specimens illustrate various stages in which the natal pelage has been replaced in large part by the incoming second coat. In No. 52172, ♀ juvenile (Gamangui, February 12, 1910) the natal pelage remains on the chin and throat, and on the top of the head, nape and shoulders; the rest of the upperparts is strongly darkened by the incoming blackish second coat. The underparts, from the pectoral region posteriorly, and the inside of the limbs, are well clothed with fine black hair. The outside of the limbs, including hands and feet, is thickly covered with short intensely black hair. The sides of the head are covered with long hair of the second coat, mostly white but mixed with dusky-tipped hairs. The tail is darkened by a mixture of blackish on the proximal third, but is pale yellow on the median dorsal line toward the tip. The flesh measurements of this specimen are: Total length, 650 mm.; head and body, 255; tail vertebræ, 395; hind foot, 100. The skull is disarticulated and not conveniently measurable. The milk dentition is not complete, the last cheek-tooth being still enclosed in the alveolus. Another specimen (No. 52175, ♂ juvenile, Medje, April 14, 1910) is approximately of the same age and size as the specimen above described, and closely agrees with it in coloration and character of the pelage.

Two other specimens (No. 52159, ♀ juvenile, Akenge, October 18, 1913, and No. 52195, ♂ juvenile, Niapu, November 30, 1913), are of nearly the same size as those last described but illustrate a more advanced stage of pelage change, the first coat having been replaced by the second everywhere except on the dorsal region, where remnants of the white silky first pelage are diffused over a broad median zone extending from the crown to the base of the tail, the natal pelage prevailing from the hinder part of the head to behind the shoulders, while more posteriorly it merely imparts a grayish tone to the prevailing black of the second coat. In a slightly older specimen the only trace of the first coat is seen in a slight mixture of soft grayish hairs on the nape and shoulders.

Several specimens, only a little older than those last described, have fully acquired the adult pelage. Of these No. 52193, ♂ juvenile, Niapu, November 30, 1913, may be taken as indicating the age at which the fully mature stage of pelage is attained. In this specimen the milk dentition is fully matured, and the crown of the first molar of the permanent set can be seen through an opening in the alveolus, but only the outer anterior cusp has reached the alveolar plane. The pelage is mature in both texture and coloration, except that the apical fourth of the tail is black at the surface nearly to the tip, and white only at the base, the white showing through for the apical 50 mm.[1] The long white hair on the shoulders, sides of the neck and cheeks is fully developed, relatively to the length of the black of the rest of the pelage of body and limbs. The flesh measurements are: Total length, 750 mm.; head and body, 280; tail vertebræ, 470; hind foot, 115; ear, 36. Skull, greatest length, 76.7; occipitonasal length, 70.4; condylobasal length, 53.6; zygomatic breadth, 52.5. The adult pelage is thus acquired before the first tooth of the permanent set has become functional.

COLOR VARIATION IN ADULTS.—The chief color variations in adults are in respect to the development of the white areas on the head, sides of the neck, and on the shoulders. As a rule there is no white band on the forehead, as in the *abyssinicus* group. In one specimen (No. 52202, ♀ adult, Poko), however, there is a narrow frontal band of short white hairs. In several others the white on the sides of the head extends forward to the anterior border of the eyes, but usually ends at the posterior border.

The long white hair forming a narrow band on the sides of the neck usually joins the white patch on the shoulders. The amount of long white hair in this band varies from what appears superficially to be a series of detached tufts to a continuous stripe. On parting the hair it is usually found to be continuous at the base.

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[1] This is an individual feature, as other specimens at this stage differ little from adults in the relative amount of white and black on the tail.

The shoulder patch also varies greatly in the amount of elongated white hair composing it, and is thus much more conspicuous in some individuals than in others, in which it may be greatly reduced.

The color of the tail is an exceedingly variable feature. It is deep black proximally and white apically, with an intermediate portion of black grizzled in various degrees with glistening white hairs. The basal portion of the tail is deep black, but the extent of the wholly black base varies from about one-sixth to one-half of the total length. Usually about one-fourth to one-third is wholly deep black, followed by a grizzled black and white portion of greatly varying extent, the amount of white gradually increasing apically to the white distal portion without a sharp boundary line between any of the three sections. In some cases the terminal white portion is very short (about one-sixth of the total length of the tail), in others nearly or quite one-half of the tail is white, or nearer white than gray. A tabulation of the coloration of the tail for a large series of specimens shows that this feature is unrelated to sex or to locality, although it has been usually stressed as an important diagnostic feature by some describers.

The apical white portion of the tail is not clear white, as in some of the forms of the *abyssinicus* group, but brownish white, of varying tone in different specimens, and is due probably, to some extent, to adventitious staining. The tail is never furnished with a terminal tuft of lengthened hairs, but it is often thicker at the tip than at some distance behind it; but in this respect there is much individual difference, the apical hairs being in many specimens not appreciably lengthened.

CRANIAL VARIATIONS.—The twenty-five male skulls of *Colobus angolensis cottoni*, of which a summary of measurements is given above (pp. 467–468) are all fully adult (either middle-aged or old) except four which have the basal suture open but the dentition fully developed. In only a few are the cheek-teeth much worn, but in the older specimens the incisors and canines are greatly worn. As so frequently happens, some of the smallest are among the oldest. It is hence proper to disregard age in adults as seriously affecting variation in size. The greatest length of the skull and the least length in this series are respectively 122.8 and 105.3 mm.; the zygomatic breadth of the same two skulls is respectively 92.6 and 82.4. Both are very old skulls with closed sutures and greatly worn teeth. The two extremes in skulls with open basal sutures and unworn teeth have the greatest length of the skull respectively 117.0 and 106.8 mm., and the zygomatic breadth respectively 82.4 and 80.0.

The seventeen female skulls of which a summary of measurements is tabulated above are also fully adult, the basal suture in only two of them being open, and all but four have the teeth more or less worn, particularly the incisors and canines. The largest skull of the fifteen with closed sutures and worn teeth measures 113.8 mm. in greatest length and 79.9 in zygomatic breadth. The smallest of the same thirteen skulls (also the smallest of the entire series) has a greatest length of 102.9 and a zygomatic breadth of 78.8 mm. The two with open basal sutures and unworn teeth measure respectively, greatest length 109.0 and 106.5 mm.; zygomatic breadth, respectively 69.6 and 75.5 mm.

There is as usual a large disproportionate variation between axial and transverse measurements in skulls of the same sex and age from the same locality. Two males with a greatest skull length respectively of 118.7 and 109.3 mm. have the breadth at the postorbital constriction respectively of 40.3 and 45.6; two other males with a skull length respectively of 119.0 and 111.4 have a zygomatic breadth respectively of 84.0 and 88.0 mm. Comparison of the interorbital and orbital breadth with the greatest length gives similar results. Female skulls are similarly variable.

Further comment on the cranial measurements seems unnecessary, as the variations parallel those of *C. abyssinicus ituricus* mentioned at length on an earlier page (pp. 461–463). The same is true of the external measurements given above. See also especially the comparative summary of both external and cranial measurements of four of the forms (*C. p. powelli, C. p. brunneus, C. abyssinicus ituricus,* and *C. angolensis cottoni*) represented in the present Congo collection of mammals (pp. 475–476).

While *Colobus angolensis cottoni* and *C. abyssinicus ituricus* differ radically in color pattern and in other pelage characters they cannot be positively distinguished by either external or cranial measurements although there is a slight average difference in size. While *cottoni* has the orbital region lower, the braincase broader and flatter, the occipital plane more nearly vertical, and the zygoma weaker and less convex than *ituricus*, single skulls uncorrelated with skins cannot be always satisfactorily discriminated as belonging to one of the forms rather than to the other, individual variation greatly exceeding the average slight differences. Both forms differ from the *powelli* group, and apparently from all of the red forms of *Colobus*, by the absence of a thin, high sagittal crest which forms a striking feature in old males of the red *Colobi*.

NOMENCLATURE OF *Colobus abyssinicus* AND *C. angolensis* GROUPS

Four early names are fundamentally involved in the nomenclature of the black-and-white forms of *Colobus* of Central Africa. These are, in the order of publication, (1) *Lemur abyssinicus* Oken (1816); (2) *Colobus angolensis* Sclater (1860); (3) *Colobus palliatus* Peters (1868); (4) *Guereza occidentalis* Rochebrune (1887).

The type region of *abyssinicus* is of course Abyssinia, but recent describers have extended the range of the group to Uganda and southward to Lakes Albert-Edward and Kivu, and westward to the Uele country. I have accepted (p. 460) *abyssinicus* as the specific designation applicable to the large series of white-mantled *Colobus* collected by the American Museum Congo Expedition at Avakubi and Faradje, with *ituricus* as the subspecific name (*Colobus abyssinicus ituricus* Matschie), notwithstanding that *Colobus matschiei uellensis* has a page precedence in the same paper. *C. m. uellensis* was based on a single specimen without definite locality, and the alleged characters are not diagnostic. In other words, *uellensis* is not satisfactorily identifiable. *C. m. ituricus* was based on a series of seven specimens from the Ituri forest near Mawambi, and is identifiably described, although the specimen designated as type is given merely as from "Ituri."

Colobus angolensis was based on an imperfect skin, without feet or face, from northern Angola. It was later recognized as occurring along the Congo (left bank) as far as the Kasai River and eastward into the region drained by its tributaries.

Colobus palliatus was based on specimens from the Zanzibar coast of East Africa (Pangani River). Its close relationship to *angolensis* was early recognized, and led to much discussion respecting their specific unity.[1] Sclater (1880, Proc. Zool. Soc. London, p. 68) believed they were specifically the same, and several later authors shared this view, which Pousargues believed to be erroneous, but his evidence, based on insufficient material, is far from convincing. In 1913 Matschie[2] made the nomenclatural error of referring *Colobus angolensis* to *C. palliatus*, the name *angolensis* having eight years priority over *palliatus*. The range of the *C. palliatus* (=*angolensis*) group has been recognized by various authors as extending across East Africa to Angola, including the Ituri forest, the Nyasa-Tanganyika Plateau, and the region of Lake Leopold II.

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[1] See especially Pousargues, 1896, Ann. Sci. Nat., Zool., (8) I, pp. 267–276, and the authors he cites.
[2] 1913, Rev. Zool. Africaine, II, February, p. 206.

Colobus occidentalis (type locality, Noki, near the mouth of the Congo) has of late been recognized by some authors as a full species, to include the white-mantled forms of northeastern Belgian Congo. *C. occidentalis* (=*C. abyssinicus occidentalis*) is a member of the *abyssinicus* group, to which those of the Lower Congo also belong. *Colobus matschiei* Neumann (1899), based on specimens from Kavirondo, was treated as a synonym of *C. occidentalis* by Elliot (1913), after he had compared the type of *matschiei* with examples of *occidentalis*. In the same year (1913) Matschie considered *C. matschiei* entitled to rank as a species, and described five new forms of it as subspecies, two of them from the Rain Forest of the Belgian Congo.

The earliest name applicable to the present large series of the black-backed form of *Colobus* is *Colobus palliatus cottoni* Lydekker (1905), the type locality of which is about two hundred miles east of the district (Avakubi, Gamangui, Niapu, and Akenge) where the American Museum Congo Expedition specimens were collected. The specific name *palliatus* is, however, antedated by *angolensis*, so that the designation here adopted (p. 466) is *Colobus angolensis cottoni*.

The known forms of the *Colobus abyssinicus* and *C. angolensis* groups, so far as known to me, are in the order of date and with their type localities, as follows:

Colobus abyssinicus Group[1]

1816. *L[emur] abyssinicus* Oken. (=*Colobus abyssinicus abyssinicus*). Abyssinia.

1835. *Colobus guereza* Rüppell. (=*C. a. guereza*). South and West Abyssinia (Provinces of Godjam and Kulla).

1885. *Colobus guereza caudatus* Thomas. (=*C. a. caudatus*). Mount Kilimanjaro.

1887. *Guereza occidentalis* Rochebrune. (=*C. a. occidentalis*). Noki, Lower Congo (near mouth).

1899. *Colobus matschiei* Neumann. (=*C. a. matschiei*). Kavirondo, Lake Victoria.

1900. *Colobus abyssinicus poliurus* Thomas. Omo River, north of Lake Rudolf.

1902. *Colobus gallarum* Neumann. (=*C. a. gallarum*). Mountains near source of Webbi Shebeli, Abyssinia.

1912. *Colobus abyssinicus kikuyuensis* Lönnberg. Escarpment Station, British East Africa.

1913. *Colobus poliurus managaschæ* Matschie. (=*C. a. managaschæ*). Managascha forest, west of Addis Abbeba, Abyssinia.

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[1] Full citations for the names here given may be found in the general list of the described forms of *Colobus* given above (pp. 435–441).

1913. *Colobus caudatus thikæ* Matschie. (=*C. a. kikuyuensis*). West slope of Mount Kenia.

1913. *Colobus caudatus laticeps* Matschie. (=*C. a. kikuyuensis*). West slope of Mount Kenia.

1913. *Colobus matschici uellensis* Matschie. (=*C. a. ituricus*). "Uelle," Belgian Congo. (Not satisfactorily identifiable.)

1913. *Colobus matschici ituricus* Matschie. (=*C. a. ituricus*). "Ituri," Belgian Congo.

1913. *Colobus matschici dianæ* Matschie. (=*C. a. dianæ*). "Kissenge." Northeast and east side of Lake Albert-Edward.

1913. *Colobus matschici dodingæ* Matschie. (=*C. a. dodingæ*). Southwest of Dodinga Mountains, Uganda.

1913. *Colobus matschici brachychaites* Matschie. (=*C. a. brachychaites*). Near Modi, between Kaya and Dufile, Lado Enclave.

1913. *Colobus abyssinicus roosevelti* Heller. Mau forest, British East Africa. (Referable to typical *C. matschici*).

1913. *Colobus abyssinicus percivali* Heller. Mount Uaragess, Matthews Range, north of Mount Kenia.

1913. *Colobus abyssinicus terrestris* Heller. Rhino Camp, Lado Enclave. (Not separable from *C. a. brachychaites.*)

1914. *Colobus occidentalis ituricus* Lorenz. Near Mawambi, Ituri Forest, Belgian Congo. (Same as *Colobus matschici ituricus* Matschie of earlier date, though described as a new subspecies.)

1914. *Colobus* (*Guereza*) *escherichi* Matschie. (=*C. a. escherichi*). Gombe, Sanga River, French Congo.

1914. *Colobus occidentalis rutschuricus* Lorenz. (=*C. a. rutschuricus*). Sassa River, southeast of Lake Albert-Edward.

Colobus angolensis Group

1860. *Colobus angolensis angolensis* Sclater. Near Bembe, North Angola.

1868. *Colobus palliatus* Peters. (=*C. a. palliatus*). Pangani River, Zanzibar coast of East Africa.

1901. *Colobus ruwenzorii* Thomas. (=*C. a. ruwenzorii*). Northwest flank of Mount Ruwenzori.

1902. *Colobus sharpei* Thomas. (=*C. a. sharpei*). Fort Hill Nyasa-Tanganyika Plateau.

1905. *Colobus palliatus cottoni* Lydekker. (=*C. a. cottoni*). Zokwa, between Mahagi and Irumu, Upper Ituri, Belgian Congo.

1908. *Colobus angolensis sandbergi* Lönnberg. Near Lufizi River, Upper Zambezi drainage, Portuguese Angola.

1913. *Colobus palliatus mawambicus* Matschie. Pemba, between Irumu and Mawambi, Belgian Congo. Referable to *Colobus angolensis cottoni.*

1913. *Colobus palliatus weynsi* Matschie. (=*C. a. weynsi*). "Unterer Congo." Lake Leopold II region.

1914. *Colobus mawambicus nahani* Matschie. Panga, Aruwimi River, Belgian Congo. Referable to *Colobus angolensis cottoni.*

1914. *Colobus maniemæ* Matschie. (=*C. a. maniemæ*). Near Kibombo, Lualaba River, Belgian Congo.

1914. *Colobus adolfi-friederici* Matschie. (=*C. a. adolfi-friederici*). Rugege forest, east of Lake Kivu.

1914. *Colobus langheldi* Matschie. (=*C. a. langheldi*). Manyema country, west of Lake Tanganyika, Belgian Congo.

1914. *Colobus benamakimæ* Matschie. (=*C. a. benamakimæ*). Sankuru River, Belgian Congo.

The two West African forms of black-and-white *Colobus* are *Colobus satanas* Waterhouse (1838), Fernando Po; and *Colobus vellerosus* (I. Geoffroy) (1834), Gold Coast to Senegambia.

The forms of the *Colobus abyssinicus* group listed above number twenty-two; those of the *Colobus angolensis* group, thirteen. It is probable that most of these thirty-five forms will prove to be recognizable geographic forms, and quite certain that a number of them will be later assigned to synonymy. According to the rules of priority *Colobus matschiei brachychaites* Matschie (=*C. abyssinicus brachychaites*) takes the place of *Colobus abyssinicus terrestris* Heller, both from nearby localities in Lado Enclave. The volume containing Matschie's paper here in question is dated on the cover of the completed volume as issued "Décembre 1913," but the title cover of fascicule 2, in which Matschie's paper appeared, shows clearly that it was issued "Août 1913." Heller's paper is dated "October 21, 1913." This indicates nearly two months' priority for Matschie's paper over Heller's.

Colobus abyssinicus roosevelti Heller should also be referred to *Colobus abyssinicus matschiei* Neumann, as Matschie has recognized specimens from Mau Forest (type locality of *roosevelti*) as referable to typical *matschiei*.

Comparative Summary of External Measurements—Average (Minimum-Maximum)—of Forms of *Colobus* from Northeastern Belgian Congo

Colobus powelli powelli

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
17 ♂	1262(1140–1351)	540(455–590)	726(650–800)	186(170–198)	39(35–42)
12 ♀	1235(1150–1340)	524(480–565)	713(645–790)	182(170–202)	37(35–40)

Colobus powelli brunneus

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
10 ♂	1295(1215–1335)	582(525–610)	714(633–785)	191(180–200)	40(38–42)
5 ♀	1268(1225–1315)	559(510–585)	709(650–750)	189(183–203)	39(35–42)

Colobus abyssinicus ituricus

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
16 ♂	1405(1270–1550)	593(535–690)	811(670–885)	191(175–207)	44(37–50)
13 ♀	1325(1235–1410)	554(485–640)	773(715–825)	179(165–190)	40(35–43)

Colobus angolensis cottoni

	Total Length	Head and Body	Tail Vertebræ	Hind Foot	Ear
21 ♂	1405(1310–1470)	581(490–640)	824(720–890)	192(180–205)	44(39–46)
15 ♀	1361(1230–1470)	561(505–610)	800(645–880)	186(171–200)	41(37–45)

Comparative Summary of Cranial Measurements—Average (Minimum-Maximum)—of Forms of *Colobus* from Northeastern Belgian Congo

Colobus powelli powelli

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
13 ♂	113.2(105.1–128.0)	91.5(86.2–97.9)	93.4(87.7–107.6)	85.6(77.4–96.7)
10 ♀	103.0(95.5–109.7)	81.3(77.3–89.7)	85.7(79.5– 91.3)	75.7(71.7–78.6)

	Orbital Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
13 ♂	67.6(63.3–77.4)	65.5(60.0–69.8)	40.3(38.0–44.0)	21.5(19.6–25.0)
10 ♀	62.0(56.7–67.2)	61.1(59.2–64.1)	35.9(34.2–38.0)	21.0(20.1–21.9)

Colobus powelli brunneus

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
17 ♂	118.7(112.2–130.7)	97.0(92.3–107.7)	96.3(91.6–103.5)	91.1(86.8–97.4)
12 ♀	104.1(97.8–109.7)	85.7(81.7– 88.4)	86.2(80.1– 92.1)	76.3(70.3–81.0)

	Orbital Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
17 ♂	71.7(65.5–77.7)	69.9(63.5–76.4)	41.2(38.0–45.5)	21.3(19.7–23.4)
12 ♀	63.1(60.4–66.1)	61.4(52.0–67.3)	36.7(34.2–39.1)	20.6(19.2–22.2)

Colobus abyssinicus ituricus

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
17 ♂	116.0(104.4–126.3)	99.8(87.0–110.3)	92.6(84.6–96.5)	81.2(70.4–88.5)
13 ♀	107.2(104.0–114.4)	92.3(84.9– 97.3)	87.3(82.4–94.6)	76.7(71.2–83.5)

	Orbital Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
17 ♂	68.0(59.4–73.4)	67.1(59.6–77.3)	41.0(37.2–47.5)	21.3(20.0–22.6)
13 ♀	65.4(61.2–69.7)	62.6(58.4–69.2)	37.7(34.5–39.5)	20.5(19.2–21.4)

Colobus angolensis cottoni

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
25 ♂	114.0(105.3–122.8)	96.8(90.0–107.0)	92.6(87.2–99.3)	84.4(80.0–92.6)
17 ♀	107.5(102.9–113.8)	88.8(78.5– 94.9)	88.5(84.1–94.3)	77.4(69.6–82.8)

	Orbital Breadth	Mastoid Breadth	Upper Toothrow	Upper Molars
25 ♂	71.2(67.0–81.2)	69.3(63.5–74.5)	39.4(37.0–42.3)	20.8(19.0–22.5)
17 ♀	65.5(59.3–72.0)	63.5(59.3–69.0)	36.4(33.8–38.3)	20.0(18.2–21.2)

PONGIDÆ

Ponginæ

Pan Oken

Simia, part, of various authors; not *Simia* (*s.s.*) Linnæus, 1758, type *Simia sylvanus* Linnæus.

1812. *Troglodytes* E. GEOFFROY, Ann. Mus. Hist. Nat., Paris, XIX, p. 87. Type, *Troglodytes niger* E. Geoffroy = *Simia troglodytes* Gmelin = *Simia satyrus* Linnæus, 1758 (not of 1766). Preoccupied by *Troglodytes* Vieillot, 1806, for a genus of birds.

1816. *Pan* OKEN, 'Lehrb. Naturges.,' Th. III, Abth. 2, pp. xi, 1230. Type, *Pan africanus* Oken = *Troglodytes niger* E. Geoffroy = *Simia troglodytes* Gmelin = *Simia satyrus* Linnæus, 1758.

1820. *Mimetes* LEACH, Thomson's Ann. Philos., XVI, August, p. 104. Type, by original designation, *Simia troglodytes* Gmelin = *Simia satyrus* Linnæus, 1758.

1828. *Theranthropus* BROOKES, 'Cat. Anat. and Zool. Museum of Joshua Brookes,' London, p. 28. Type, by monotypy, *Troglodytes niger* E. Geoffroy = *Simia troglodytes* Gmelin = *Simia satyrus* Linnæus, 1758.

1838. *Anthropopithecus* BLAINVILLE, Ann. Franç. et Étrang. Anat. et Physiol., II, p. 360. Type, *Anthropopithecus troglodytes* (Gmelin) = *Simia satyrus* Linnæus, 1758.

1841. *Hylanthropus* GLOGER, 'Hand. u. Hilfsbuch Naturges.,' I, pp. xxvii, 34. Type, *Hylanthropus troglodytes* (Gmelin) = *Simia satyrus* Linnæus, 1758.

1856. *Satyrus* MAYER, Arch. Naturgesch., I, p. 281, part; for Gorillas, Chimpanzees and Ourangs, collectively.

1860. *Pseudanthropos* REICHENBACH, "Fortsetzung Vollständ. Naturgesch."; 1862, 'Vollständ. Naturges. Affen,' p. 191. To replace *Troglodytes* E. Geoffroy, preoccupied.

1866. *Pongo* HÆCKEL, 'Gen. Morphol. Organismen,' II, p. cl, footnote. To replace *Troglodytes* E. Geoffroy, preoccupied. Not *Pongo* Oken, 1816.

1866. *Engeco* HÆCKEL, 'Gen. Morphol. Organismen,' II, p. cl, footnote. Type, *Engeco troglodytes* (Gmelin) = *Simia satyrus* Linnæus, 1758.

1895. *Anthropithecus* Hæckel, 'Syst. Phyl. Wirbelth.,' III, p. 600. (= *Anthropopithecus* Blainville).

1905. Fsihego (subgenus of *Pan*) De Pauw, 'Notes sur la Solidification et le Montage des grands Mammifères,' Saint Nichols (Belgium), p. 13, Pl. I (mounted animal and skeleton). Type, *Fsihego ituriensis* Matsche. *Simia Anthropopithecus*) *ituricus* Matschie, however, was not published until 1912.

A dozen different generic designations have been employed for the chimpanzees, most of them proposed distinctively for this group and based on the same genotype. The only available name, under the 'International Code of Zoological Nomenclature,' is *Pan* Oken (1816), brought to light by Palmer[1] in 1904. *Troglodytes* E. Geoffroy (1812) and *Mimetes* Leach (1820) proved to be preoccupied and various other names were given to replace them. For many years *Anthropopithecus* Blainville (1838) was the current name for the group. *Pan* may be said to have now come into general use by a large number of systematists, it being adopted without reservation by Elliot in 1913[1] as the correct generic name of the group.

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[1] 1904, 'Index Generum Mammalium,' p. 109.

Matschie[2] however rejected *Pan* in 1904 on the ground that Oken's nomenclature in his 'Lehrb. Naturgesch.' is not consistently binominal, and adopted *Simia* Linnæus (1758) as the correct name for the chimpanzee, which is the "first species" of the genus. It has since been shown to belong, under the principle of tautonomy, to the Barbary ape.[3] Rothschild, following Matschie, also adopted *Simia* for the chimpanzees, stating: "I, therefore, who, in opposition to Professor Matschie, consider Oken's names applicable, would have had to accept *Pan* as the generic name of the Chimpanzee, as do many American writers, but for the fact that a still older name exists,"[4] accepting *Simia* under the "first species" rule, as did Matschie.

In this connection reference may be made to a singular lapsus by both Matschie and Rothschild in compiling the generic synonymy of the orangs, the date of *Satyrus* Lesson being given by them as 1799 instead of 1840, erroneously making the date of *Satyrus* Lesson the same (1799) as that of *Pongo* Lacépède; but Rothschild correctly adopts, "as the least confusing name," *Pongo* Lacépède for the orang-outans.

The number of forms (species and subspecies) of chimpanzees cannot now be even approximately determined, nor can the ranges of any of them be defined except provisionally and in general terms, nor their synonymy positively allocated. About thirty-five species names have been proposed for chimpanzees, a few of them as substitutes for other names of earlier date. Of the twenty-eight proposed for supposed new forms, eighteen were published during the years 1912, 1913, 1914, all but one by a single author.

In 1904 Matschie reviewed the group of chimpanzees, under the generic designation *Simia*, recognizing seven species, all previously described.[5] In the following year the chimpanzees were again revised by Rothschild, also under the generic name *Simia*, in a general paper on the anthropoid apes. He recognized twelve forms (5 species, 7 subspecies), one of the subspecies being described as new.[1] He differed widely from Matschie, whose paper he reviewed at length, not only in the number of forms he recognized but in the allocation of names given by previous authors.

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[1] 1913, 'Rev. Primates,' III, (1912), pp. 227–254.

[2] 1904, 'Bemerkungen über die Schimpansen,' Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 55–69. Discussion of the generic name of the group, pp. 55–58.

[3] Cf. Thomas, 1911, Proc. Zool. Soc. London, p. 125; Elliot, 1913, 'Rev. Primates,' II, pp. 172–173.

[4] 1904, Proc. Zool. Soc. London, II, (April 1905), p. 419.

[5] Matschie, Paul. 1904, 'Bemerkungen über die Schimpansen,' Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 55–69.

Species recognized: (1) *Simia satyrus* Linnæus, (2) *Simia calvus* (Du Chaillu), (3) *Simia vellerosus* (Gray), (4) *Simia schweinfurthii* (Giglioli), (5) *Simia fuscus* (A. B. Meyer), (6) *Simia leucoprymnus* (Lesson), (7) *Simia chimpanse* (Mayer).

Cf. also: Matschie, Paul. 1900, 'Einige Bemerkungen über die in Berlin aufbewahrten Exemplare von Anthropopithecus,' Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 77–85.

The next formal revision of the chimpanzees was made by Elliot in his great work on the Primates published in 1913.[2] Eleven forms are recognized, of which ten are full species and one is a subspecies, all under the generic name *Pan* Oken, now for the first time adopted in a revision of the chimpanzee group. No new forms were proposed, but four specimens from the Cameroon were recorded at the end of his review as not satisfactorily referable to any of the forms he formally recognized. All of them later became types of new species by another author.[3] Four forms reduced to synonyms by Matschie are given recognition. The differences between Elliot's and Rothschild's list are radical as regards the allocation of forms, their relationships, and nomenclature, and Rothschild's new subspecies is referred to *Pan fuliginosus* as a synonym.

The type localities and ranges of all but two of the forms of chimpanzees described prior to 1912 are West African, being included within the area (chiefly the coastal portion) extending from French Congo to Gambia; the other two are from the extreme eastern border of Belgian Congo. Since this date four have been added from Cameroon and eleven from the Upper Congo drainage. As a matter of interest the forms described to date, so far as known to me, are listed below, with their type localities stated as definitely as practicable, and the nature of the material on which they were originally founded.

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[1] Rothschild, Walter. 1905, 'Notes on Anthropoid Apes,' Proc. Zool. Soc. London, (1904), II, April, pp. 413–440, Pl. xxiv, text figs 99–117. Chimpanzees, pp. 420–431, Pl. xxiv (colored; *Simia vellerosus* (Gray), very old male), and text figs. 105–115.

Species and subspecies recognized: (1) *Simia vellerosus* (Gray), (1a) *Simia vellerosus fuliginosus* (Schaufuss), (2) *Simia satyrus* (Linn.), (2a) *Simia satyrus marungensis* (Noack), (2b) *Simia satyrus schweinfurthi* (Giglioli), (3) *Simia koolookamba* (Du Chaillu), (4) *Simia aubryi* (Gratiolet & Alix), (5) *Simia pygmæus* Schreber, (5a) *Simia pygmæus fuscus* (Mayer), (5b) *Simia pygmæus leucoprymnus* (Lesson), (5c) *Simia pygmæus chimpanse* Matschie, (5d) *Simia pygmæus raripilosus* subsp. nov.

[2] Elliot, Daniel Giraud, 1913, 'A Review of the Primates,' I–III. Although printed in 1912, the actual date of issue was June 1913. The chimpanzees occupy pp. 227–254, Pls. xxxiv–xxxix, and 7–8, of Vol. III.

Species and subspecies recognized: (1) *Pan calvus* (Du Chaillu), (2) *Pan fuliginosus* (Schaufuss), (3) *Pan satyrus* (Linnæus), (4) *Pan kooloo-kamba* (Du Chaillu), (5) *Pan leucoprymnus* (Lesson), (6) *Pan chimpanse* (Mayer), (7) *Pan schweinfurthi* (Giglioli), (8) *Pan schweinfurthi marungensis* (Noack), (9) *Pan aubryi* (Gratiolet et Alix), (10) *Pan vellerosus* (Gray), (11) *Pan fuscus* (Meyer).

[3] Matschie, Paul. 1914, 'Neue Affen aus Mittelafrika,' Sitzungsb. Ges. Naturf. Fr. Berlin, pp. 323–342.

Descriptions of three new species of *Gorilla*, ten new species of *Anthropopithecus* (=*Pan*), ten new forms of the *Colobus* group, two (including a new genus *Cercolophocebus*) of the *Cercocebus* group. It also includes critical comment on Elliot's treatment of the gorillas and chimpanzees in his 'Review of the Primates,' including a list of errors in the spelling of locality names.

Specific and Subspecific Names Referable to *Pan*

West Africa

1758. *Simia satyrus* Linnæus, 'Syst. Nat.,' 10th Ed., p. 25. Based on Tulp's figure and description of a black ape from West Africa.

1788. *Simia troglodytes* Gmelin, Linnæus, 'Syst. Nat.,' I, p. 26. *Simia satyrus* Linnæus, 1758, renamed.

1812. *Troglodytes niger* E. Geoffroy, Ann. Mus. Hist. Nat., Paris, XIX, p. 87. *Simia satyrus* Linnæus, 1758, renamed.

1831. *Troglodytes leucoprymnus* Lesson, 'Illustr. Zool.,' Pl. xxxii. Male, skin and skull of an individual long kept in confinement, originally "pris sur la côte de Guinée."

1855. *Troglodytes tschego* Duvernoy, Arch. Mus. Hist. Nat., Paris, VIII, pp. 8–248 (passim), Pls. i–xvi (Pl. i is legended "*Troglodytes tschego* Duv.," but usually the species is mentioned as "Tschego" or "Troglodyte Tschégo." No diagnosis nor type locality; only comparative mention in a paper on the anatomy of anthropoid apes. Usually synonymized with *Pan satyrus* (Linnæus) by later authors.

1856. *Satyrus chimpanse* Mayer, Arch. Naturgesch., I, p. 282. No type locality; no known type. A new specific name for the Chimpanzee group collectively.

1860. *Troglodytes calvus* Du Chaillu, Proc. Boston Soc. Nat. Hist., VII, August 20, p. 296. Based on a single female from the interior of Gaboon, south of Cape Lopez. Other specimens mentioned. Type in British Museum; skull figured by Elliot (1913, 'Rev. Primates,' III, (1912), Pls. xxxiv, xxxv).

1860. *Troglodytes kooloo-kamba* Du Chaillu, Proc. Boston Soc. Nat. Hist., VII, November 23, p. 358. One specimen; sex and age not stated. Ashankola Mts., upper Ovenga River, French Congo. Type in British Museum; skull figured by Elliot (1913, 'Rev. Primates,' III, (1912), Pls. xxxvi, xxxvii), p. 242.

1862. *Troglodytes vellerosus* Gray, Proc. Zool. Soc. London, p. 181. Provisional name in the text, based on a skin without skull from North Cameroon.

1866. *Troglodytes aubryi* Gratiolet et Alix, Nouv. Arch. Mus. Hist. Nat. Paris, II, p. 258. Young female. "Afrique équatoriale."

1870. *Pseudanthropus fuliginosus* Schaufuss, 'Nunquam Otiosus, Zool. Mittheil.,' p. 345. Skin and skull, immature. French Congo. Exact type locality in doubt.

1895. *Anthropopithecus fuscus* Meyer, Abhandl. Ber. Zool. Anthrop. Mus. Dresden, V, No. 14, p. 7, footnote. Based on a young female in the Dresden Zoological Gardens; type not known to exist. Type locality unknown, but supposed to be the Gold Coast.

1904. *Simia schimpanse* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 68 (in text). To replace *Satyrus chimpanse* Mayer (1856), in case the latter should prove untenable.

1905. *Simia pygmæus raripilosus* Rothschild, Proc. Zool. Soc. London, (1904), II, April, pp. 422, 430, text-fig. 111 (p. 428; head). French Congo, but type locality not definitely indicated. Type in Tring Museum.

1914. *A[nthropopithecus] ellioti* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 327 (in text). Adult male skin, from near Bascho, North Cameroon.

1914. *Anthropopithecus oertzeni* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 327. Adult male skin, from near Bascho, North Cameroon.

1914. *Anthropopithecus reuteri* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 328. Adult male skin and skeleton from near the mouth of the Dume River, South Cameroon.

1914. *Anthropopithecus ochroleucus* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 329. Adult male skin and skeleton. North of Sangmelima, upper Lobo River, South Cameroon.

1919. *Anthropopithecus schneideri* Matschie, Zeitschr. Ethnol., LI, p. 75, figs. 4–5. Type, an adult male, from Fernan Vaz district, French Congo, exact locality not known.

1919. *Anthropopithecus papio* Matschie, Zeitschr. Ethnol., LI, p. 80, fig. 7. Type, a male, from Barombi, Elephant Lake, Cameroon.

Upper Congo Drainage and Borderlands

1872. *Troglodytes schweinfurthii* Giglioli, Ann. Mus. Civ. Stor. Nat. Genova, III, p. 114 footnote, 135. Two young skulls. Upper Uele drainage, Niam-niam country, northeastern Belgian Congo.

1887. *Troglodytes niger* var. *marungensis* Noack, Zool. Jahrb., September, II, p. 291, Pl. x. An immature imperfect skull, without skin, the skull lacking the facial portion. Manda, Marungu, west of Lake Tanganyika, Belgian Congo.

1905. *Fsihego ituricus* De Pauw (cf. addendum, p. 497).

1912. *Simia (Anthropopithecus) nahani* Matschie, Rev. Zool. Africaine, II, September, p. 118. Type, an adult male, skin and skull; also two immature females. All from Banalia, Aruwimi River, Belgian Congo.

1912. *Simia (Anthropithecus) cottoni* Matschie, Rev. Zool. Africaine, II, September, p. 124. Type, an immature male; also two other specimens, all with partly developed permanent dentition. All three from Sassa (Ishasha) River, southeast of Lake Albert Edward, western border of Uganda.

1912. *Simia (Anthropopithecus) ituricus* Matschie, Rev. Zool. Africaine, II, September, p. 121. Adult male, skin and skull. Makala-Avakubi Road, Belgian Congo.

1913. *Simia (Anthropopithecus) adolfi-friederici* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 46. Adult male, skin and skeleton. Bugoie forest, northeast of Lake Kivu, western border of German East Africa.

1913. *Simia (Anthropopithecus) kooloo-kamba yambuyæ* Matschie, Ann. Soc. Zool. Malacol. Belgique, XLVII, (1912), August, p. 46. Skin of an adult without skull. Yambuya, lower Aruwimi River, Belgian Congo.

1914. *Anthropopithecus purschei* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 332. Adult male, skin and skeleton. Tschingogo Forest, between Lake Kivu and Lake Luhondo, western border of German East Africa.

1914. *Anthropopithecus pfeifferi* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 333. Adult female, skin and skeleton. Three days march east of Russissi on the border of Urundi near sources of Akanjaru, western border of German East Africa.

1914. *Anthropopithecus graueri* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 333. Adult female, skin and skeleton. Eighty kilometers northwest of Boko, west shore of Lake Tanganyika, Belgian Congo.

1914. *Anthropopithecus castanomale* Matschie, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 334. Young male, skin and skeleton. Northeast shore of Lake Tanganyika, border of Urundi, German East Africa.

1914. *Anthropopithecus calvescens* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 334. Adult male, skin and skull. On road from Baraka to Kasongo, between Niembo and Kabambare, on the Luama River, west of Lake Tanganyika, Belgian Congo.

1914. *Anthropopithecus schubotzi* MATSCHIE, Sitzungsb. Ges. Naturf. Fr. Berlin, July, p. 335. Adult male skull. Between Kilo and Irumu, upper Ituri River, west of Lake Albert Edward, Belgian Congo.

1914. *Anthropopithecus steindachneri* LORENZ, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, No. 27, December, pp. 550–551. "Ituri-Urwald . . . bei dem Dorfe Moëra," north of Beni, Belgian Congo. Type (and only specimen), a skin and skeleton of an old male.

Little is known of the types or original material on which the species of the earlier authors were based, as few of the types of those described prior to 1860 appear to have been preserved. The species themselves have been interpreted by later authors on other material. In several instances the original type was a skin without skull, or a skull without skin, and in many instances were immature specimens. Nearly all of the numerous forms recently described were based on single specimens, and in the few cases where paratypes were available, they were so immature as to have no diagnostic value. Hence the descriptions of supposed new forms are descriptions of individuals merely, not of "species," or even racial forms. This regrettable disregard for possible variation in this as in other groups of mammals tends to disconnect taxonomy from natural history. I do not hesitate to place in synonymy most of the chimpanzees described by Matschie in later years from the interior of Africa. The diagnostic characters cited are amply covered by the present series. I have my doubts only as to racial forms occurring in the higher mountain forests and the extreme eastern edge of their distribution.

Elliot's review of the chimpanzees is based on his personal examination of the types, so far as they are known to be extant, and such other material as existed at that time in the principal museums of Europe. It was of course impracticable for him to bring all this material together for direct comparison, and he had to depend upon his notes and his exceptionally good memory in reaching final decisions; but he spared neither time nor expense to render his examinations thorough and trustworthy. They cannot be taken, however, as infallible, but his attitude was conservative, and from the purely nomenclatural side his work is commendable. The fine series collected by Arrhenius in the Rutshuru region and so carefully described by Lönnberg and the thirty specimens collected by Lang and Chapin in the Ituri-Uele region are most important contributions furnishing further proof of the great plasticity of the skull and facial characters, which latter are now for the first time available through

Lang's fine series of portraits taken in the field from specimens in the flesh. This series helps confirm my own conclusions as to the great variation existing in the Pongidæ and adds many convincing details. Elliot's remarks upon the group as a whole, however, are so much to the point that it seems desirable to here reproduce them at considerable length.

> It cannot be said that at the present time, a list of the species and races of Chimpanzees can be satisfactorily given. We really know so little about them; the color of the young, the changes that take place from youth to age, the hues of the face, hands, and feet, whether these are permanent from youth to the adult state, what, if any, are the distinctions in color between the sexes (in some species we know there is no difference, but in others we are not so sure); what are the limits of the dispersion of those we gaily describe as distinct—do two or more species or races, call them what you will, dwell together in amity retaining their distinctive characteristics within limited areas; all these problems and more arise to greet us, and for the most of them we have no answer.
>
> The material gathered in most Museums is so small and unsatisfactory, that it is of no avail in deciding the facts we all seek. The best, and so far as I have found, the only considerable collection of these animals extant to-day, is in the Berlin Museum, where about eighty skins and perhap as many skulls have been brought together from different parts of Africa. But when we study these, we constantly meet with difficulties that not only perplex us, but prevent any satisfactory decision from being reached. It is easy enough to solve a difficulty by describing some troublesome specimens as new, and leaving the proof for some one else to discover, but that does not solve legitimate doubts, nor help overmuch to teach us the truth we desire to know.
>
> In seeking for characters upon which specific differences may be founded we naturally first examine the crania, and at once we are confronted with a fact that prevails among all the great Apes, that individual variations exist to such an extent, that no one character can be depended upon, for no two skulls are alike, and they differ from each other in a manner equally great as is observed among human skulls. I have already commented upon this fact when discussing the specific values of the Gorilla and the Ourang-utan, where in the latter I was compelled to decline to recognize more than one species after most careful investigation of a very large series of crania; and to recognize only with great doubt certain forms of Gorilla as possible species, not on any cranial character, but simply on the color of the fur which eventually may prove, as our knowledge of these animals increases, to be merely phases of pelage attributable solely to age. Certainly neither among Gorillas nor Ourang-utans can any specific difference be safely based upon cranial characters, and in this respect the Chimpanzees are no exception. At present, therefore, we rely mainly for our specific characters of these animals upon the texture, length and color of the hair; the presence or absence of beard; color of the face; sometimes of the hands and feet; seldom on the teeth, (for characters among these are rarely found), the extent in which the face is prognathous, and the presence or absence of a part in the hair on the head, or the existence of baldness, and its extent behind the ears. No doubt some of these are valid specific characters, and it is equally certain that there are several species of Chimpanzees, but it may also be regarded as a fact, that some of the characters above cited as specific are not valid, and that, with the material at present

> available no one can decide how many of the specimens described have an undoubted specific standing. That problem will be solved by our successors; at present we are groping in the dark so far as the number of existing species of the great Anthropoids are concerned.—1913, 'Review of the Primates,' III, pp. 227–229.
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> . . . Thus far the material in the Berlin Museum, which is, without exception, the most extensive to be found anywhere, instead of assisting us to solve the problem of how many species exist, only makes it more difficult than ever, for the skulls present such endless variations, and the skins, by the diverse coloring of the fur, and the different hues and disposal of tints on the face, hands and feet, exhibited at times in examples from the same locality, that it is practically impossible to decide how many species really do exist, or if too many have not already been recognized. Herr Matschie has given much thought and study to this material, but was not by any means satisfied, at the time I examined these specimens with him, that the correct number of species had been demonstrated. Also which examples represent races, and which species, has by no means been ascertained.—Idem, p. 232.
>
> . . . If our determinations are correct, we have the singular fact that nearly all the recognized forms of Chimpanzees, like the Gorillas, are crowded together on a small portion of West Africa, leaving us to wonder how so many distinct forms, if they are such, could exist in so restricted a territory and preserve their specific characters intact.—Idem, p. 233.

The sixteen forms (fourteen described since Elliot wrote the above), from the Upper Congo and adjoining regions might well suggest a similar inquiry respecting Central Africa.

Since Elliot wrote on the chimpanzees, considerable series have been brought together from single localities that throw much light upon the subject of purely individual variation among adult chimpanzees, and the changes due to age. Lönnberg in his report on the mammals collected by Arrhenius[1] in the region of Lake Albert Edward and Lake Kivu, published in 1917, has given a detailed account of a series of ten chimpanzees collected on the Rutshuru River, of which seven are adult and three immature, all taken in practically the same forest. The variations in external, cranial, and dental characters are described at length, he reaching the conclusion that "In spite of all differences it appears impossible for the present but to regard all as individual variations of one and the same race. This is of very high interest as very seldom wild animals from one and the same place vary in such a remarkable degree" (*loc. cit.*, p. 23). Further reference to this valuable paper will be made later in the present article.

As particularly pertinent to the general subject of "species" and individual variation, I transcribe the opening paragraph of a paper by

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[1] Lönnberg, Einar. 1917, 'Mammals collected in Central Africa by Captain E. Arrhenius,' Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, pp. 1–110, Pls. I–XII, 11 text figs. Chimpanzees (*Anthropopithecus* cf. *cottoni* Matschie), pp. 18–27, Pls. V–VI.

H. V. Wilson of the University of North Carolina entitled 'In regard to Species and Sponges,'[1] just to hand at this writing:

> In the language of systematic zoology, species are particularly "difficult to distinguish" in certain genera, in many genera of sponges, for instance. Where this is so, it is in large part due to the fact that many specimens from various regions have been reported on. In such cases we begin to be face to face with the facts (of variation) as they are, not as they are assumed to be, when the species description rests on one or two specimens or on specimens from one locality.

Pan schweinfurthii (Giglioli)

Plates CLII-CLXV; CLXVI, Figure 2; CLXVII

Troglodytes schweinfurthii GIGLIOLI, 1872, Ann. Mus. Civ. Stor. Nat. Genova, III, p. 135. Niam-niam country, northeastern Belgian Congo.

Troglodytes niger var. *marungensis* NOACK, 1887, Zool. Jahrb., II, p. 291, Pl. x. An immature imperfect skull, without skin, the skull lacking the facial portion. Manda, Marungu, west of Lake Tanganyika, Belgian Congo.

Fsihego ituriensis De Pauw, 1905 (cf. addendum, p. 497).

Simia (Anthropopithecus) nahani MATSCHIE, 1912, Rev. Zool. Africaine, II, p. 118. Type, an adult male, skin and skull; also two immature females. All from Banalia, Aruwimi River, Belgian Congo.

Simia (Anthropithecus) cottoni MATSCHIE, 1912, Rev. Zool. Africaine, II, p. 124. Type and two other specimens. Sassa (Ishasha) River, southeast of Lake Albert Edward, western border of Uganda.

Anthropopithecus cf. *cottoni* LÖNNBERG, 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, p. 18. Ten specimens from Rutshuru.

Simia (Anthropopithecus) ituricus MATSCHIE, 1912, Rev. Zool. Africaine, II, p. 121. Adult male from Makala-Avakubi Road, Belgian Congo.

Simia (Anthropopithecus) kooloo-kamba yambuyæ MATSCHIE, 1913, Ann. Soc. Zool. Malacol. Belgique, XLII, (1912), August, p. 46. Adult from Yambuya, Lower Aruwimi River, Belgian Congo.

Anthropopithecus calvescens MATSCHIE, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 334. Adult male taken on the road from Baraka to Kasongo, between Niembo and Kabambare on the Luama River, west of Lake Tanganyika, Belgian Congo.

Anthropopithecus schubotzi MATSCHIE, 1914, Sitzungsb. Ges. Naturf. Fr. Berlin, p. 335. Adult male from between Kilo and Irumu, upper Ituri River, west of Lake Albert Edward, Belgian Congo.

Anthropopithecus steindachneri LORENZ, 1914, Anz. Ak. Wiss. Wien, Math.-Nat. Kl., LI, pp. 550–551. "Ituri-Urwald . . . bei dem Dorfe Moëra," north of Beni, Belgian Congo. Type an old male.

Represented by thirty specimens, essentially from two localities as regards environment—one section on the northeastern border of the Rain Forest (Aba, 3 specimens; Faradje, 9 specimens); the other, within the Rain Forest, and comprising seven collecting stations: Avakubi, Gamangui, Pawa and Ngayu (1 specimen from each), Niapu (4 specimens), Medje (6 specimens), Akenge (4 specimens). Aba and

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[1] 1919, The Scientific Monthly, IX, No. 4, October, pp. 349–357.

Faradje are about 40 miles apart, and about 300 miles northeast of Akenge and Niapu, the most western of the Rain Forest stations. The seven stations in the Rain Forest are all within an area of about 70 miles square.

Twenty-four are skins with skulls and 6 are skulls only. In addition 23 skeletons were secured, ranging from young with milk dentition to old adults. The localities and dates of collecting are:

Aba, 3 (1 old ♂, 1 young ♂, 1 subadult ♀), December 25, 1911.

Faradje, 9 (nearly all adult), April 1, 3, 1911–November 12, 1912.

Akenge, 4 (3 adults, 1 juvenile), September 15, 29, October 4, 1913.

Pawa, 1 (young), July 28, 1914.

Medje, 6 (all adult), February 23, April 2, July 15, 1910; April 27, 29, June 16, 1914.

Niapu, 4 (2 adult, 2 immature), November 12, 14, December 19, 1913; January 20, 1914.

Gamangui, 1 (young ♀), February 15, 1910.

Ngayu, 1 (old ♂), December 24, 1909.

Avakubi, 1 (old ♂), March 10, 1914.

The external measurements—average (minimum-maximum)—of eleven adults of *Pan schweinfurthii*, taken from animals in the flesh, are as follows:

	Total Length	Hind Foot	Ear
7 ♂	834(770–925)	249(237–270)	77(66–95)
4 ♀	783(700–850)	227(220–235)	64(60–67)

The cranial measurements—average (minimum-maximum)—of fourteen adults of *Pan schweinfurthii* are as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length	Zygomatic Breadth
10 ♂	198(190–220)	156(145–170)	146(139–154)	133(124–139)
4 ♀	190(176–192)	151(139–155)	142(133–148)	126(107–130)

	Mastoid Breadth	Braincase Breadth	Orbital Breadth	Interorb. Breadth
10 ♂	124(117–133)	103(98–118)	108(101–115)	20.4(17.4–24.0)
4 ♀	121(103–124)	100(96–102)	103(91–105)	20.6(13.0–22.4)

	Postorb. Breadth	Breadth at Base Canines	Breadth outside m^3–m^3
10 ♂	70.4(67.8–74.1)	60.6(54.0–67.7)	56.8(52.0–61.3)
4 ♀	70.2(66.5–71.7)	58.1(50.8–63.0)	60.3(47.5–67.0)

	Upper Toothrow c–m^3	Upper Molars
10 ♂	58.9(54.7–62.8)	45.1(42.2–48.5)
4 ♀	55.6(52.6–58.0)	44.0(39.8–47.0)

Lönnberg[1] gives the cranial measurements—average (minimum-maximum)—of seven adult chimpanzees from Rutshuru, eastern Belgian Congo, as follows:

	Greatest Length	Condylobasal Length	Occipitonasal Length
2 ♂	191.7(186.0–197.5)	147.8(145.0–150.5)	146.4(141.8–151.0)
5 ♀	183.2(177.0–189.0)	141.8(137.5–144.6)	139.0(134.8–143.5)

	Zygomatic Breadth	Braincase Breadth	Orbital Breadth
2 ♂	127.3(123.5–131.0)	100.0(100.0–100.0)	100.1(98.5–103.7)
5 ♀	118.6(113.0–123.2)	96.2(92.4–100.0)	96.4(90.2–101.0)

	Interorb. Breadth	Breadth at Base Canines	Breadth at m^3
2 ♂	19.3(18.8– 19.8)	62.0(58.4– 65.5)	54.2 (53.6– 54.7)
5 ♀	14.2(11.6– 18.3)	51.6(50.0– 54.0)	54.4 (51.3– 58.0)

	Upper Molar Series	Upper True Molars
2 ♂	44.7(43.1– 46.3)	30.6(29.5– 31.7)
5 ♀	42.4(39.0– 44.8)	29.1(26.3– 30.5)

Age and Individual Variation in Chimpanzees

As noted on a preceding page (p. 484), Lönnberg[2] gave in 1917 his results of a detailed study of a series of ten chimpanzees (skins with skulls) from a single collecting station near Rutshuru, on the Rutshuru River, "about half way between Lake Albert Edward and Lake Kivu," on the boundary between Belgian Congo and German East Africa. These specimens were provisionally referred to *Anthropopithecus cottoni* Matschie, originally described from immature specimens collected on the Sassa River, southeast of Lake Albert Edward, a locality "not geographically very distant from Rutshuru." This series of chimpanzees was the first large series of these apes from a single locality available to any investigator for comparative study. It included three males (one adult, one old adult, one young with the milk dentition and first molar) and seven females (five adult and two young with milk dentition). Each specimen is described in detail in respect to both external and cranial characters, and their individual differentiations are carefully noted. It is thus the first important contribution to a correct understanding of individual variation in chimpanzees. As supplementing Lönnberg, I am able to contribute further information to this hitherto little understood subject, based on thirty specimens collected by Lang and Chapin of the American Museum Congo Expedition from December 1909 to July 1914, of which nine are from a single locality (Faradje, at the extreme northeast border of the Rain Forest district), and eighteen from neighboring collecting stations in a nearly uniform environment, hence essentially from a single locality, in the Upper Congo Rain Forest, since all of them were obtained within about a 50 mile radius from the central point of the area. I shall give first a summary of Lönnberg's results and conclusions, following this with a statement of my results and conclusions based on the Congo series.

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[1] 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September, p. 22.
[2] 1917, Kungl. Sven. Vet. Ak. Handl., Stockholm, LVIII, No. 2, September 1, pp. 18–27, Pls. v–vi.

YOUNG.—Lönnberg states that the three "young ones have a completely black pelage, but the chin is greyish white and there is a white patch above and surrounding the anal opening. The colour of the naked face is reddish brown, the colour of the dry skin somewhat resembling the palest shade of 'brownish drab,' or in other places a light shade of 'burnt amber.' The ears have also a similar tint. It is of course difficult to say whether this corresponds to the colour of the living animal, or not, but evidently it has had a light brownish face, perhaps with a russet tinge."

COLOR OF NAKED PARTS.—"The old animals have the naked parts much darker, so that at the first look they appear to be quite black in the face. One of the specimens, No. 224, is really quite black all over the face and on the ears." Others are described as having "the face quite black," but with the cheeks lighter or "reddish black" or (in different specimens) "russet brown," or a pale shade of "brownish drab," or (in the oldest male) "only the centre of the face being black, and the cheeks and the crown brown, mottled with black."

BALDNESS.—"In the young animals only the face is naked, already the fore-head a little above the eyes being sparingly beset with black hairs. All the adult animals display baldness in various degrees," the bare area varying in extent and in outline in different specimens. "The baldness increases evidently with age," as shown by the oldest male and the oldest female.

PELAGE.—A detailed account is given of the length of the hair on different parts of the body and at different ages, and of the "side whiskers" and postauricular tufts. "With increasing age the fur of some parts appears to become scantier than in the young animals not only on the head, but also on the throat. This is especially conspicuous on the old male in which also the hind neck is almost bare, only with scattered hairs."

COLOR OF PELAGE.—"The colour is also gradually changed with age, the adult being not quite [as] black as the young." But it is shown to vary irregularly, as one adult female is practically "black all over," while another female, evidently younger, "has the head decidedly brownish," and "the back is overlaid with a brownish tint produced by brown tips to some hairs; the hind legs are similar, though with less brownish. . . . The beard on the throat is paler and somewhat more grayish brown, the scattered hairs on the chin are whitish grey."

The color of the different males is also described in detail, showing much variation in different individuals, concluding as follows: "The description thus given proves that the fur and its colour is rather variable in these Chimpanzees. Partly this variation is explained by the difference in age, the old ones gradually becoming more bald-headed and more pale brownish grey on the lower back and the hind legs. The almost complete blackness of the rather old female No. 224, and the shortness of the fur of the male No. 163 appear, however, without accordance with other facts and indicate a strange variability which is also displayed by the skulls, as will be set forth below."

General Size.—The males are slightly larger than the females both in external and cranial measurements. The total length of two males is given as 910 and 930 mm.; of three females, respectively, 830, 840, 890 mm., measured from the skins. They are hence not satisfactorily comparable with measurements taken from specimens in the flesh.

Cranial Measurements.—Lönnberg's table of cranial measurements is summarized above (p. 487). The average greatest length of the two adult male skulls is 192 mm.; of five females, 183 mm., the extremes of the latter being 177 and 189 mm. (For other measurements see table, *loc. cit.*). Lönnberg states that his measurements "show a very considerable variation, chiefly with regard to the orbits, interorbital space, and the teeth." He comments at length on these divergences in the different specimens, especially with reference to the dorsal outline of the superciliary ridge, which varies from an even line to one having a deep concavity above the interorbital space, a variation common to both sexes. He states that in one of the females "the mesial concavity amounts to nearly 4 mm., which does not sound much, but nevertheless gives a quite strikingly different aspect of these skulls, effected by the simultaneous raising of the eyebrow ridges with a mesial concavity between them and the increased height of the orbits. . . It is also of interest to note that the skulls with raised eyebrow ridges (No. 178, 224, and 160) at the same time have a considerably narrower interorbital septum than the others."

Teeth.—Considerable space is also given to the striking variations seen in the size and shape of the molar teeth and in the number of their tubercles. He summarizes these variations with reference to their significance as follows: "There is thus no certain correlation between small molars on one hand, and a doubly arched superciliary ridge and a narrow interorbital septum on the other hand. Nor do the characters mentioned stand in correlation to the colour of the fur, as one of the small-toothed, No. 224, is the blackest, and the other, No. 178, is the greyest among the females. . . Thus, although the differences in certain cases, for instance with regard to the breadth of the interorbital space, and the size of the molars, certainly are great enough to appear to be of distinguishing value between different races the lack of correspondence, as set forth above, upsets every attempt of separating these specimens in two racial groups, as for instance a large-toothed and a small-toothed. In spite of all differences it appears impossible for the present but to regard all as individual variations of one and the same race."

He dwells especially upon the discordant variation in the size and form of m^3 in comparison with the other molars. He finds that m^3 not only varies greatly in size and shape relatively to the other teeth, but that the number and size of its cusps "are also variable characteristics, but seemingly independent of others. . . Normally there ought to be four cusps, two outer and two inner, but their development is variable. Especially the posterior inner cusp is often reduced in size, or even lacking. This is so irregular that the same animal may have four cusps on one, but only three on the other side, and this may happen in large-toothed as well as in small-toothed specimens."

He further demonstrates that "the size of p^1 is variable as well." Moreover that "the lower jaw is also extremely variable in shape"; and that the size of the foramen magnum varies greatly in both size and shape. He also notes several instances of supernumerary molars, and the very wide range in the capacity of the brain cavity.

Brain-Size.—A table is given showing the capacity of brain-cavity in two adult males, five adult females, and a young female with milk dentition. "From this table," he says, "can be seen that with regard to the capacity of the brain-cavity these Chimpanzees can be arranged in two groups, one with smaller, and one with larger brain. One of these groups comprises three females and a male, the other two females and a male. The difference in volume of the brain-cavity is with regard to the females more than 50 ccm., and with regard to the males about 44 ccm., thus in both cases quite considerable [in other words, 10.9 per cent in the two males and 14.5 per cent in the five females]. The question presents itself then again, is this difference due to racial distinction, or not? For the elucidation of this it is necessary to investigate, if there exists any correlation between this difference in brain-capacity and the variation of other characteristics which has been discussed above. Such an investigation is facilitated by the table of measurements above. From this we learn that two of the small-brained females (No. 178 and 224) have small teeth, but this is not at all the case with the third (No. 161). The first two of these small-brained females have raised eyebrow ridges and thus comparatively high orbits, the third again (No. 161, Pl. v, fig. 3) has the superciliary arch very little raised and therefore comparatively low orbits. On the other hand especially one of the large-brained females (No. 160, Pl. v, fig. 4) has raised eyebrow-ridges and very large orbits."

Breadth and Shape of Palate.—Lönnberg also says: "The breadth and shape of the palate is also very different in the different specimens. Two of the small-brained ones (No. 178 and 224) have a comparatively broad and flat palate with a width inside m^2 of about 36.5 mm., but the third (No. 161) has the narrowest and most vaulted palate of all with a width inside m^2 of 28 mm. On the other hand the corresponding measurement of one of the large-brained females (No. 181) is 34.5 mm., but in the other (No. 160) it is 37.5 mm. The old large-brained and large-toothed male has the palatal breadth inside of m^2 34 mm.; in the comparatively small-toothed and small-brained male the same dimension is almost similar or 34.5 mm. In such a case it is evidently impossible to use this character for dividing the present material of Chimpanzees in two racial groups. The longest palate measuring 73.7 mm. is found in one of the small-brained (No. 161), but also the shortest palate, 69.5 mm., belongs to a small-brained specimen (No. 224)."

"This complete irregularity of the variable characteristics makes it plainly difficult to attribute any racial value to the differences in the size of the brain-cavity as expressed above. This does not exclude that in other cases a difference with regard to the capacity of the brain-cavity may be of racial value as Selenka has proved to be the case with the Orangs."[1]

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[1] This last statement regarding Selenka's work on the Orangs is so amazing, in view of Elliot's careful exposition of its fallacies (1913, 'Rev. Primates,' III, (1912), pp. 183–187, 190–191, 193–194, Pls. xxiv–xxviii), that it challenges comment. Elliot's historical account of the nature and character of the material used by Selenka, and Selenka's own statement of the hypothesis forming the basis of his discrimination of some fifteen races of orangs from a limited district of Borneo, and the immense amount of purely individual variation known to characterize the skulls of these animals, including the capacity of the braincase, is sufficient evidence of the worthlessness of Selenka's racial forms of Borneo orangs.

A much earlier paper than Elliot's 'Rev. Primates,' by Frederic A. Lucas (1883, 'The Species of Orangs,' Proc. Boston Soc. Nat. Hist., XXI, pp. 228–233), based on the large collection of orangs made by Wm. T. Hornaday in Borneo, should not be overlooked in any investigation of the orangs, since it is based on a series of 30 specimens from definitely known localities, with measurements and field notes by the collector. Variations in reference to sex, age and individual variation are described in detail. As Lucas took up the study of this material with the opinion that it represented "two good species," his final conclusion is of interest. " . . . the name *Simia satyrus* must stand for all Bornean Orangs and probably for those of Sumatra also, although it would be strange if some slight variation did not exist in specimens from the latter Island." This conclusion is in agreement with Elliot's, reached many years later and apparently without knowledge of the existence of Lucas' paper, as he does not mention it. Furthermore Lucas found that "the animals with cheek protuberances are *invariably* old males," and hence this feature is not "dimorphic" as some recent authors have assumed.

In former years I had opportunity to examine two large series of orangs from definite localities in Borneo, with the result that I became deeply impressed with the range of variation due to sex, age, and individualism, especially the latter, in these animals.

The foregoing résumé of Lönnberg's studies of the Rutshuru collection of chimpanzees indicates the care and detail with which he has conducted his researches, the record of which occupies about ten quarto pages and two plates of his memoir on the Arrhenius collection of mammals from the eastern border of Belgian Congo. It is given large space here not only on account of its intrinsic importance, and for its direct bearing on other chimpanzee material from a district a few hundred miles northwest of Rutshuru, now to be considered, but because they are the results of an independent investigator who has not heretofore been particularly identified with this line of work. He speaks indeed of his discoveries in respect to individual variation as being "of very high interest as very seldom wild mammals from one and the same place vary in such a remarkable degree" (*loc. cit.*, p. 23). On the other hand, it is a subject to which I have devoted the greater part of a life-time, and such developments bring to me no surprise. For why should not chimpanzees show variations, or physical individuality, as well as other large mammals when an adequate amount of material from a single locality has been assembled for study?

The thirty specimens of chimpanzees (twenty-four skins with skulls, six skulls without skins, and twenty-three skeletons), material brought together with so much industry and care by the collectors, Lang and Chapin, from a limited district in the Upper Uele and Ituri River drainage, more than confirm the results of the study of Lönnberg's series, as would be expected from the larger number of specimens available for comparative study. For the most part they show parallel variations to those from Rutshuru, but include some new features, due in part perhaps to the greater age of some of the adults. The two collections together cover, in a general way, a region which includes the type localities of a considerable number of species, including a half-score recently described by Matschie (see list, p. 485).

External Characters of Chimpanzees

IMMATURE.—Ten specimens are young, ranging in age from one apparently only a few days old to those that have acquired m^1, or both m^1 and m^2, and of which one-half are from the Faradje district and the other half from the Medje-Niapu district. The color of the pelage in all is deep black with the perineal area white. They are thus practically indistinguishable in coloration of pelage, which varies, however, in length with the age of the individual. The coloration of the naked parts varies only slightly, the face being much lighter colored than in adults. In the dry skins the color of the face is pale brown, with usually a slight russet tone, varying slightly in different specimens, and more pronounced on the cheeks than elsewhere. Probably in life the variation individually would be more marked, in some the face approaching pinkish drab or pinkish pale brown. The hands and feet appear to agree very nearly in color with the face.

In the youngest specimen, in which the incisors and canines are only beginning to break through the gums, the whole underside of the body and inside of the limbs is nearly naked and pale yellowish brown like the face. The whole head is heavily clothed with black rather soft hair about 25 mm. long; the rest of the upperparts are thinly haired, the skin showing through; the hair is much shorter and thinner than on the head.

At a later stage (milk dentition, m^1 not fully mature) the body is well clothed, the pelage deep black, the long hair on back 45 to 50 mm. Several specimens.

At a still later stage (m^1 fully developed and m^2 nearly so), similar to the last mentioned above, except that the pelage is longer and a little heavier, the hair on the back about 60 mm. long. Several specimens. Two others somewhat older (m^3 partly up) are similar except that the pelage is slightly less intense black. In the youngest specimens the forehead is thinly haired, with scattering hairs nearly to the eyebrows. In older ones the forehead becomes nearly bare. The chin is thinly haired like the forehead; in some instances the chin hairs are whitish, giving a grayish tone.

ADULT.—About the time m^3 appears, but before it is fully developed, the general tone of the pelage becomes duller or brownish black. A little later still (m^3 mature but unworn) many of the hairs on the lower back are tipped with pale brown or whitish. With the advance of age this condition becomes greatly emphasized, the pelage becomes, as a rule, thinner and shorter and coarser and harsher. A female from Faradje (No. 51376; Pls. CLVIII, fig. 2; CLIX), with mature but unworn dentition, has the lower back and hind limbs dull brownish black with a strong rufescent tone, due to a heavy mixture of pale brownish-tipped hairs. In this specimen the entire chin has a profusion of whitish hairs, not present in another Faradje adult. An old male from the same locality, (No. 51377, the teeth greatly worn) is similar in coloration to the female just described, the lower back and hind limbs being brownish black due to pale reddish brown hair-tips, which are also diffused to a much less extent over the fore-back.

An old male from Medje (No. 51209, teeth greatly worn) has the pelage everywhere rather thin and short, the lower back grizzled with gray and black, the thighs and anterior back varied with scattered yellowish gray hairs. Hair of back 35 mm. in length, long hair on the shoulder, 70 to 75 mm. long.

Two adult males from Akenge show differences as follows: No. 51381 (with greatly worn teeth) has the whole top of the head yellowish gray somewhat grizzled with black; shoulders and anterior back darker; lower back yellowish white with scattered black-tipped hairs; hind limbs similar but with a larger proportion of black-tipped or wholly black hairs. In No. 51278 (Pls. CLVII; CLVIII, fig. 1) m^3 is fully developed but not worn, the pelage is thin and short, dull brownish black in general effect on the dorsal area, owing to a grizzle of reddish brown hair-tips, the rufescent tone stronger on the lower back and hind limbs, less developed on the fore limbs. These two males from the same locality differ strikingly, doubtless in part owing to difference in age. An adult female (dentition slightly worn) from the same locality is similar in all respects to No. 51278, but is slightly less rufescent.

An old male (No. 51394) from Avakubi has the top of the head in front of the ears nearly naked; the lower back is yellowish gray in general effect, with a sprinkling of black-tipped hairs; hind limbs darker, the dark basal portion of the hairs showing through the lighter tips. Hair on back about 35 to 40 mm. long.

An old male from Ngayu (No. 51393) has the pelage thin and short, dull black in general tone, the lower back and both fore and hind limbs grizzled with pale rufescent hair-tips.

An old male from Medje (No. 51202) has also a thin pelage, deep black, the hairs of the lower back and hind limbs with a slight grayish tipping, giving a much lighter or yellowish gray effect. An old male from Niapu (No. 51382; Pls. CLIII; CLIV, fig. 1) with greatly worn teeth and thin pelage is dull black with no appreciable mixture of light-tipped hairs except on the lower back, although very old.

From the foregoing it is evident that there is a wide range of color variation among adults, some of which is ascribable to age. Also the pelage is variable in respect to heaviness and length, the hairs varying in length on the middle of the back from 30 to 40 mm., and on the shoulders from 60 to 80 mm., with corresponding variations on the sides of the head and throat.

The color of the face is usually black, but is sometimes merely dark brown. The chin is usually thinly covered with whitish or grayish hairs, but in a considerable number the chin hairs are black or brownish black.

The forehead is usually thinly haired, but in two of the old males the head is nearly bald as far back as the front of the ears. In none is the hair distinctly parted by a bare median line or space. The hair on the top of the head shows slight differences in the manner of radiation from the mesial line. In the majority of specimens it is directed on the anterior third of the crown laterally at a nearly right angle to the mesial line; on the middle part the direction inclines obliquely backward, and on the posterior part of the crown the direction is mainly backward in a uniformly diminishing angle from the median line.

EARS.—The ears, as shown by the careful measurements taken in the flesh by Lang and Chapin, vary much in size in both young and old individuals. In young specimens with milk or incomplete permanent dentition the length of the ear varies from about 50 to 60 mm.; in comparable adults the length in four males varies from 66 to 95 mm., with an average of about 77 mm.; in three old females, from 60 to 67 mm. with the average at 64 mm. In the dry skin the ear of these same specimens measures considerably less, rarely more than from 50 to 65 mm. In some recent diagnoses of new forms of chimpanzees considerable stress has been laid upon the size of the ear, when the only basis for measurement must have been a single dry skin.

Cranial Characters of Chimpanzees

SIZE.—The above summary (p. 486) of cranial measurements shows that while males average larger than females there is an overlapping in size, some females being slightly larger than some males of exactly comparable age. The series of males is large enough to show that skulls of comparable age vary in greatest length from 190 mm. to 220 mm.—a range sufficiently large to cover the whole range of skull length in all the described forms, so far as recorded measurements are available. These include not only those given in Elliot's 'Rev. Primates' but also those of type specimens of various authors, and those of Matschie's several papers on chimpanzees.

The present series of skulls shows a wide range of variation in practically every feature, due in part to age but mainly to purely individual differentiation. They parallel in a general way those recorded by Lönnberg, but greatly extend in many instances the range of difference found by him in the much smaller Rutshuru series, as might be expected. These variations are shown in the dorsal outline of the superciliary ridges, the size of the orbits and the ratio of their transverse and vertical dimension; the size and form of the anterior narial opening—deep and narrow in some, shallow and broad in others, and in the correlated length and width of the nasals; the shape and size of the foramen magnum; the breadth and vaulting of the palate; the length, width and relative convexity or depression of the basisphenoid region; the wide range in size of the teeth, taking the toothrow as a whole, and the great variation in the size of the posterior teeth in comparison with more anterior ones of the same toothrow, or the corresponding teeth in other skulls; also in the number of cusps on the posterior molars, as recorded in some detail by Lönnberg; variation in the transverse measurements of the skull as compared with its axial length, etc.; the amount of space separating the temporal ridges, and the presence or absence of a sagittal crest. The width of the facial portion of the skull greatly varies, as does also the facial angle. Many of these differences have been regarded as specific characters by various authors, especially by Matschie, in the description of supposed new forms based on a single specimen, as unfortunately many of the alleged forms have been founded.

Matschie states[1] that his *Simia* (*Anthropopithecus*) *nahani* "ist die einzige unter den beschriebenen [Formen], welche eine Schädel-Crista besitzt." Elliot's Plates XXXIV and XXXV of Volume III of the 'Rev. Primates' (not published when Matschie made this statement) show such a crest in the type skull of *Pan calvus* (Du Chaillu), and Plates XXXVIII and XXXIX show its presence in an old skull of *Pan vellerosus* (Gray). It is also present in two of the old male skulls of the present series.

It is perhaps almost needless to say that the presence or absence of a sagittal crest in chimpanzees, as in many groups of carnivores, and in other mammals in which this feature is found, is dependent upon age, it apparently occurring only in very old males. The temporal ridges in young chimpanzees are far apart and gradually approach each other as the animal advances in growth and in age till in very old males they meet on the median line and unite to form a more or less strongly developed median crest. The method of development of the sagittal crest, so common in certain mammals, should present no mystery, yet we find its presence or absence frequently regarded by mammalogists as a character of diagnostic value for subspecies, and sometimes for species, even by authors of considerable experience. Many authors without adequate resources, or blinded by prepossessions, make use of many features of individual differentiation that a comparative study of large series of specimens of the same form from a single locality would show were valueless for the discrimination of even races. And in no group have such discriminations been carried to greater excess than in the chimpanzee group.

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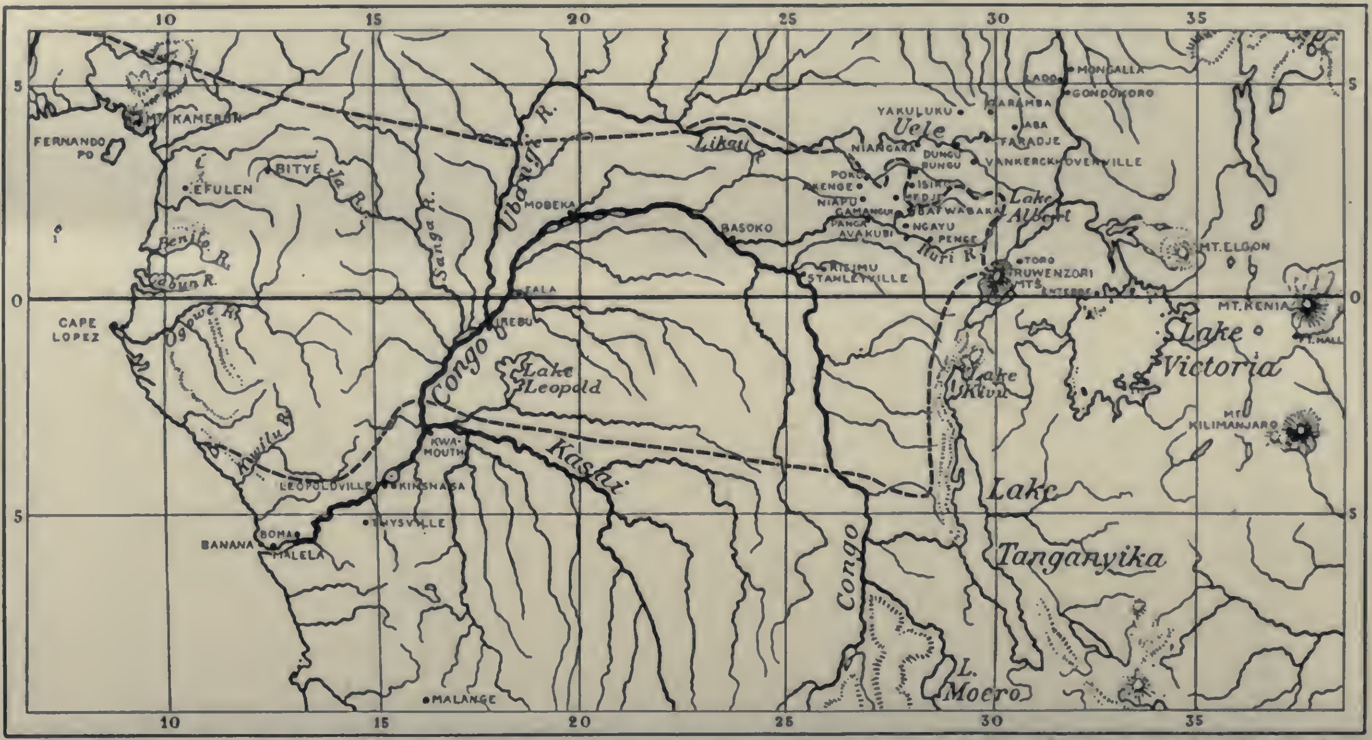
[1] 1912, Rev. Zool. Africaine, II, fasc. 1, September, p. 118.

The variation in cranial features cannot be illustrated at present. Sixteen plates (Pls. CLII-CLXVII), however, show features seldom dealt with in other papers, due to Lang's work in the field. The portraits of ten chimpanzees, mostly front, side, and three-quarter views, furnish proof that the physiognomic features in these large Primates vary fully as much as one might have expected from the cranial differences. It becomes clear that even such a character as the shape of the ears, considered diagnostically of specific value, is equally variable. These photographs add much convincing proof that a relatively great plasticity is one of the dominant features in this group. A photograph of the hand and foot of an adult female (Pl. CLXVI, fig. 2) and another of the arboreal nest (Pl. CLXVII) are also presented.

ADDENDUM

Fsihego iturienis De Pauw, 1905, 'Notes sur la Solidification et le Montage des grands Mammifères,' Saint-Nicolas (Belgium), p. 13, Pl. i. No description. Based on figures of mounted animal and skeleton, as appearing in a caption: "*Fsihego iturienis* Matschie. Sous genre *Fsihego*.—Race spéciale de l'Ituri et du Congo central."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EFULEN
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Benito R.
Campo R.
CAPE LOPEZ
Ogowe R.
Kwilu R.
Sanga R.
Ubangi R.
MOBEKA
Congo
IREBU
EALA
Lake Leopold
KWA-MOUTH
LEOPOLDVILLE
KINSHASA
THYSVILLE
BOMA
BANANA
MALELA
MALANGE
Kasai
Likati R.
BASOKO
YAKULUKU
Uele
NIANGARA
DUNGU
BUNGU
PORO
AKENGE
NIAPU
ISIRO
MEDJE
GAMANGUI
BAFWABAKA
PANGA
AVAKUBI
NGAYU
PENGE
Ituri R.
RISIMU
STANLEYVILLE
LADO
MONGALLA
GONDOKORO
FARAMBA
ABA
FARADJE
VANKERCKHOVENVILLE
Lake Albert
TORO
RUWENZORI MTS.
ENTEBBE
MT. ELGON
MT. KENIA
FT. HALL
Lake Victoria
Lake Kivu
MT. KILIMANJARO
Lake Tanganyika
Congo
L. Moero

Map of the Congo and Lake Region of Africa, showing principal localities where primates were collected by the Congo Expedition, as well as others mentioned in the present paper. The limits of the West African rain forest are indicated by a broken line.

List of Localities at Which Primates Were Collected by The Congo Expedition but not Indicated on the Accompanying Map (p. 498).

Abawe.—2° 30′ N., 26° 50′ E.
Babeyru.—1° 55′ N., 27° 40′ E.
Bafuka.—4° 20′ N., 27° 50′ E.
Bafwaboli.—0° 40′ N., 26° 10′ E.
Banalia.—1° 30′ N., 25° 40′ E.
Batama.—1° N., 26° 40′ E.
Bolobo.—2° 15′ S., 16° 15′ E.
Kamunionge.—1° N., 27° 5′ E.
Kisenje.—1° 35′ S., 29° 15′ E.
Lubilo.—1° N., 27° 10′ E.
Lukolela.—1° 10′ S., 17° 10′ E.
Mosembe.—1° 15′ N., 18° 35′ E.
Munye Katoto.—0° 35′ N., 26° 5′ E.
Pawa.—2° 25′ N., 27° 50′ E.
Ukaturaka.—2° N., 20° 30′ E.
Zambi.—6° S., 12° 50′ E.

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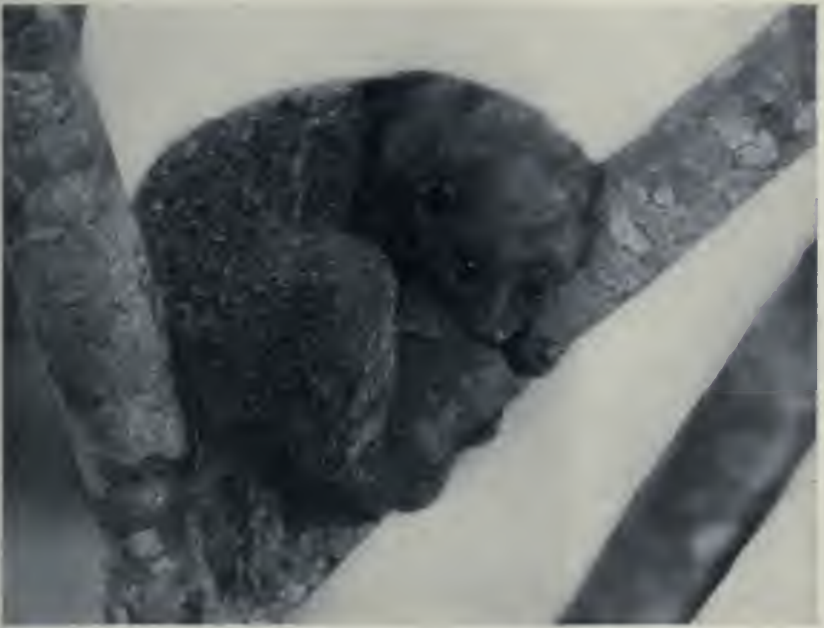
PLATES LXXIX TO CLXVII

Plate LXXIX

Perodicticus potto faustus Thomas

Male adult, Amer. Mus. No. 52687, Avakubi, October 26, 1909. Total length of animal, 332 mm. Live animal.

Figs. 1 and 2. Habitual positions when climbing or resting in trees.



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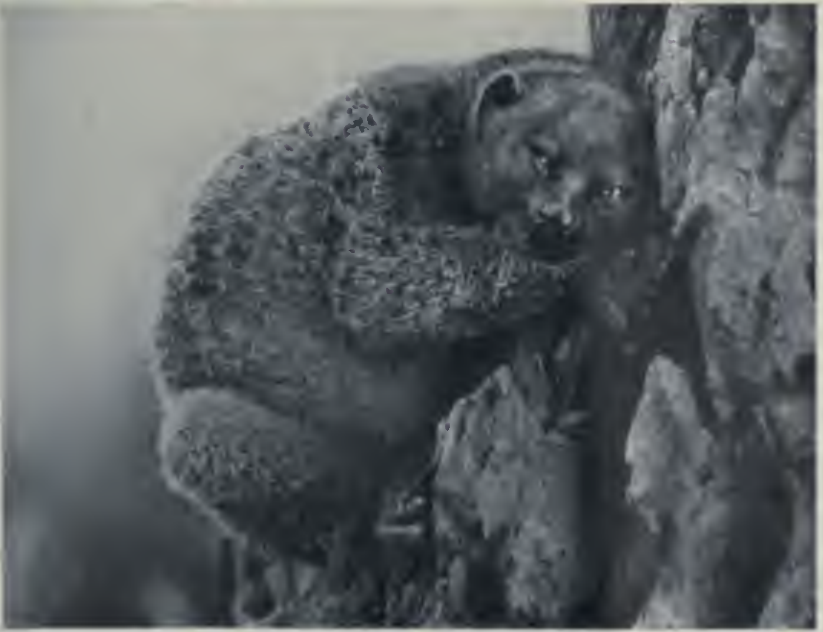

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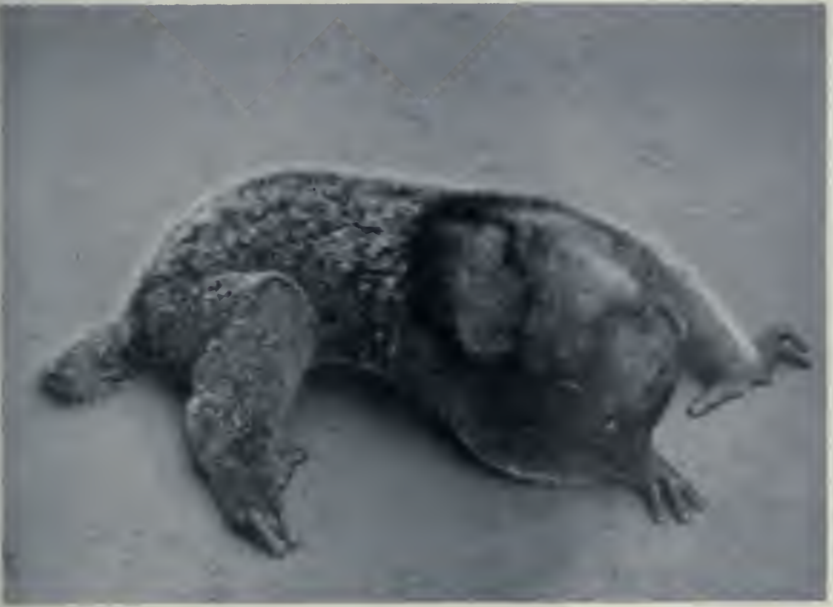
PLATE LXXX

Perodicticus potto faustus Thomas

Fig. 1. Male adult, Amer. Mus. No. 52687, Avakubi, October 26, 1909. Total length of animal, 332 mm. Showing its awkward manner of progressing on the ground.

Fig. 2. Male juvenile, Amer. Mus. No. 51023, Medje, April 23, 1914. Total length of animal, 155 mm. Clinging to a native's hand as it clings to its mother's back. Live animals.



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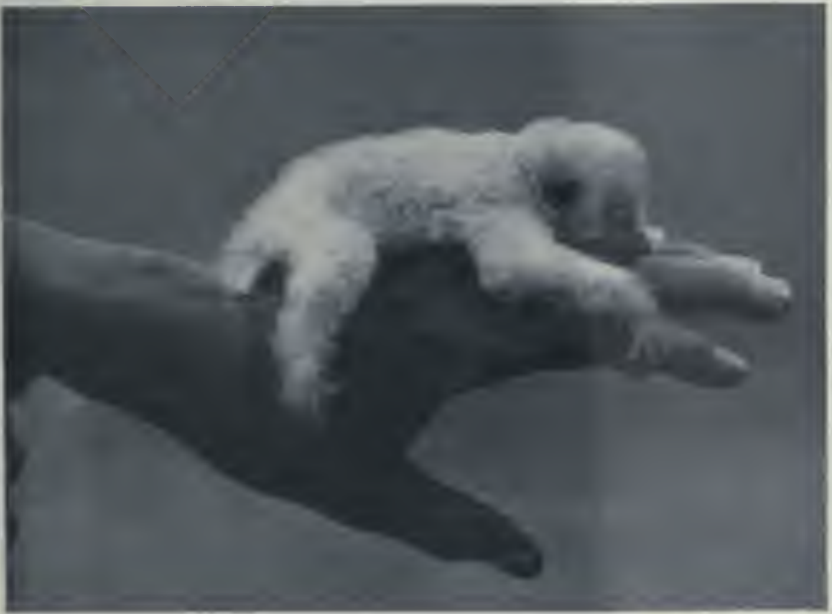

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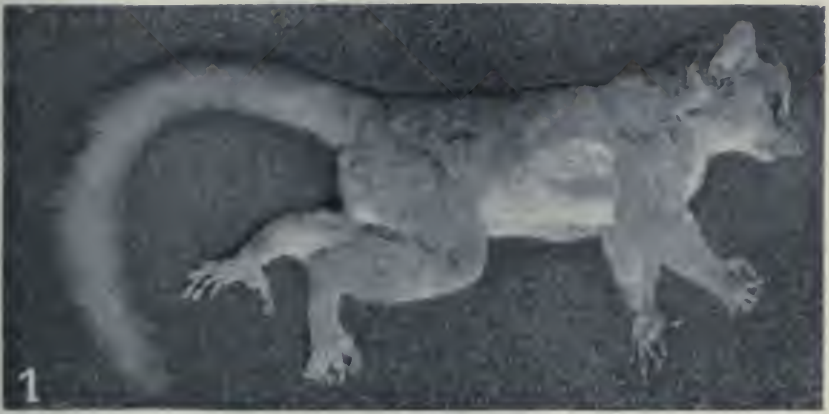
PLATE LXXXI

Galagoides demidoffii medius (Thomas)

Fig. 1. Female adult, Amer. Mus. No. 50968, Medje, March 24, 1914. Total length of animal, 314 mm. Specimen in the flesh. Lateral view showing general body proportions.

Figs. 2 and 3. Same, side and front views of head. The ridges where the ear is folded are visible.

Fig. 4. Male juvenile, Amer. Mus. No. 50970, Medje, March 24, 1914. Total length of animal, 175 mm. Live animal.



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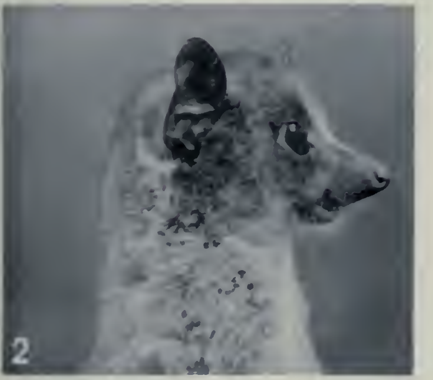

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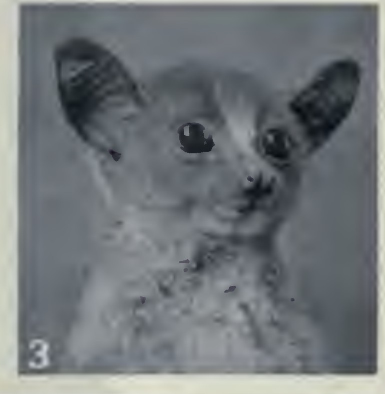

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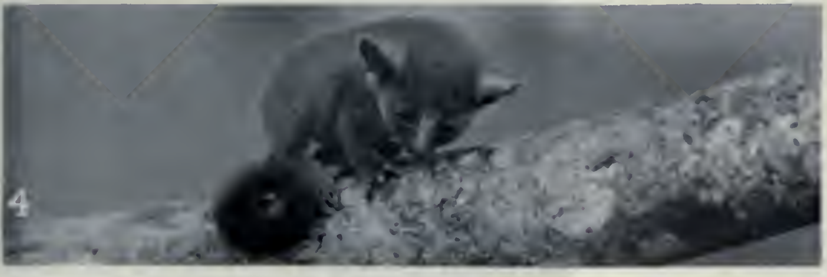

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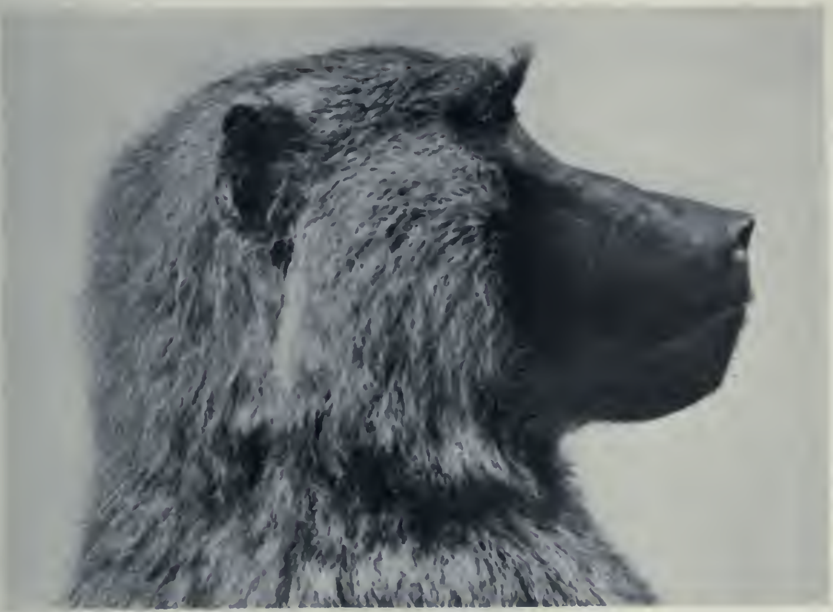
Plate LXXXII

Papio doguera heuglini Matschie

Male adult, Amer. Mus. No. 52676, Bafuka, April 1, 1913. Total length of animal, 1270 mm. Specimen in the flesh.

Figs. 1 and 2. Side and front views of head.



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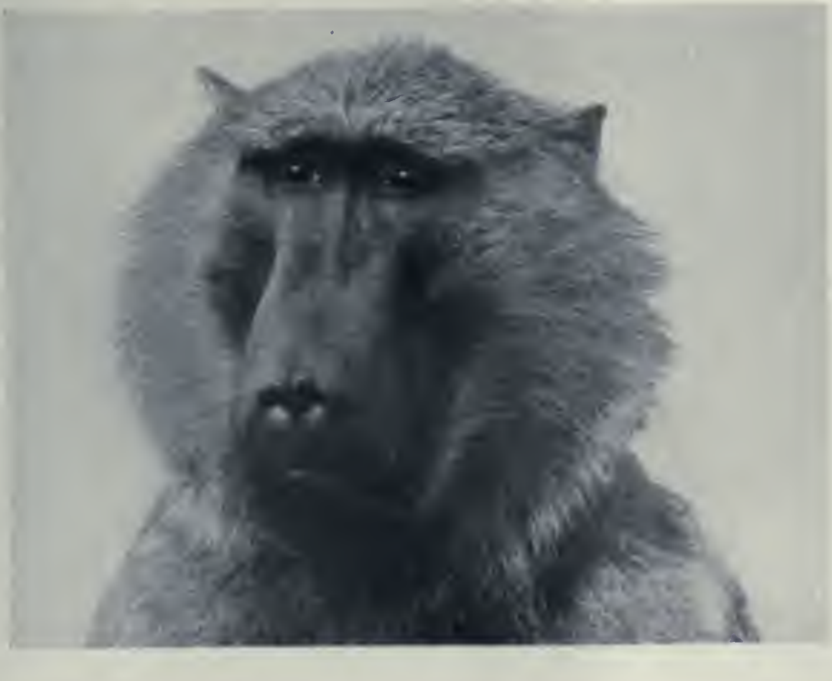

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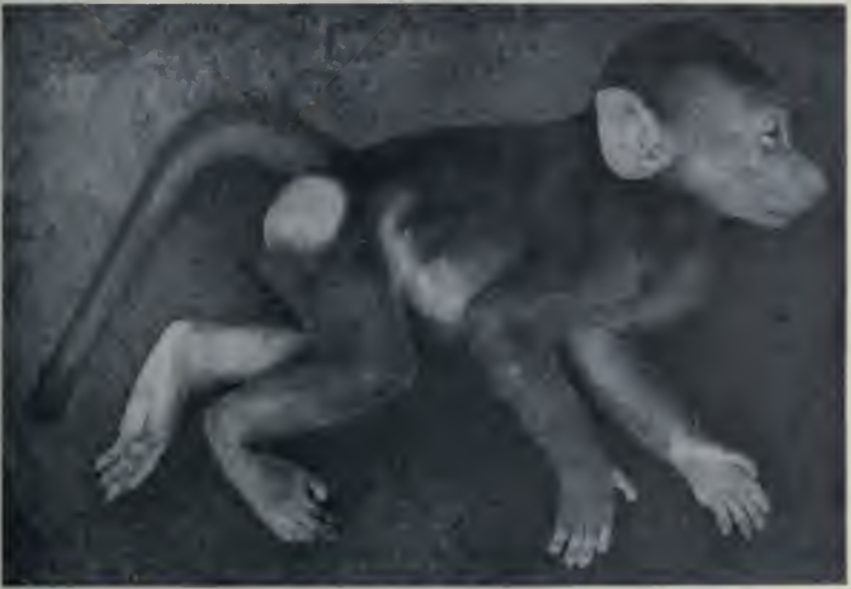
Plate LXXXIII

Fig. 1. *Papio doguera tessellatus* Elliot. Male juvenile, Amer. Mus. No. 52669, Akenge, October 2, 1913. Total length of animal, 565 mm. Specimen in the flesh. Showing characteristics of baboons, the lengthened head, peculiar form of ears, large ischial callosities, and the habitual upward bend of the tail at its base.

Fig. 2. *Lasiopyga pygerythra griseisticta* (Elliot). Juvenile, Faradje, May 1911. Live animal. Feeding on guava, an introduced fruit, of which these monkeys are very fond.



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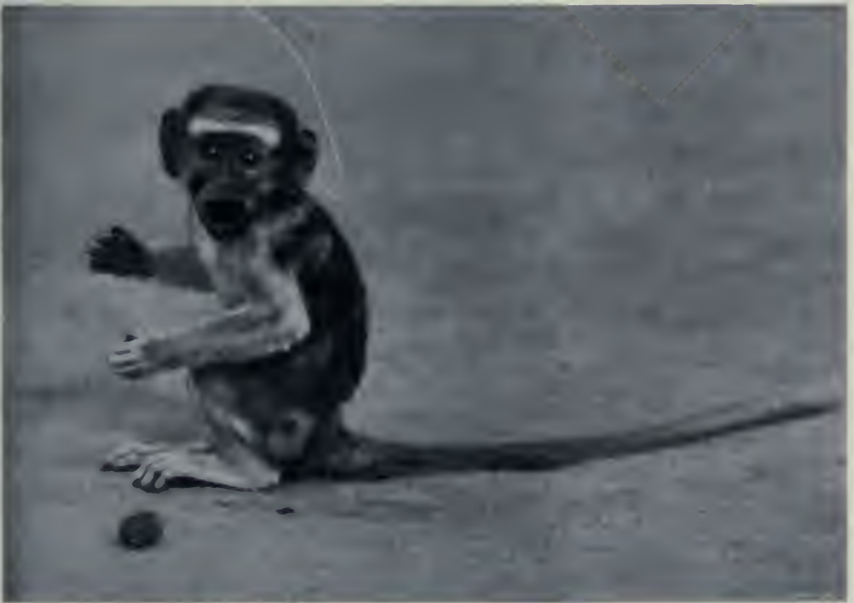

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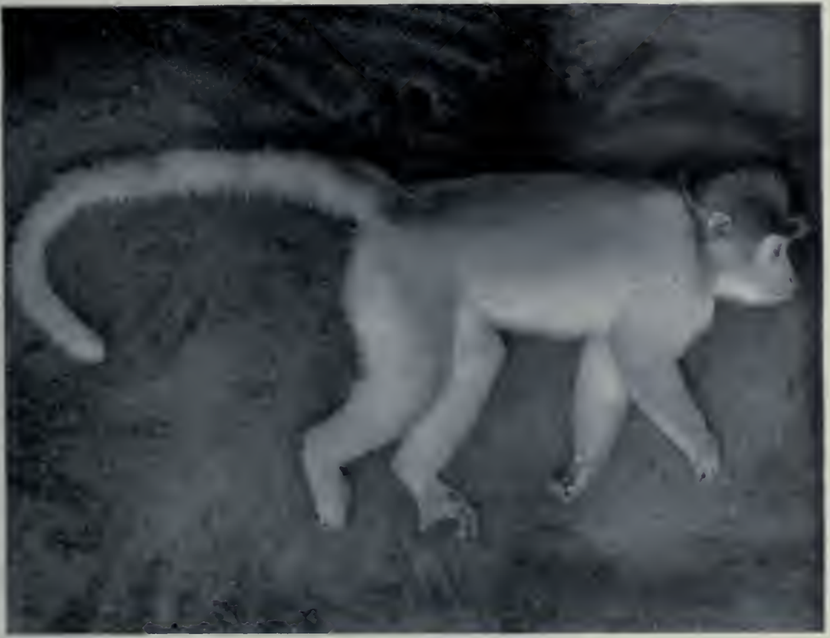
Plate LXXXIV

Cercocebus agilis Rivière

Fig. 1. Male adult, Amer. Mus. No. 52634, Akenge, September 28, 1913. Total length of animal, 1280 mm. Showing general body proportions. The roughened hair on the tail is an indication of the use they make of the tail to secure better hold in certain positions by winding it half or quarter way round the branches.

Fig. 2. Female juvenile, Amer. Mus. No. 52638, Akenge, October 4, 1913. Total length of animal, 565 mm. The young have the hair on the tail smooth. Specimens in the flesh.



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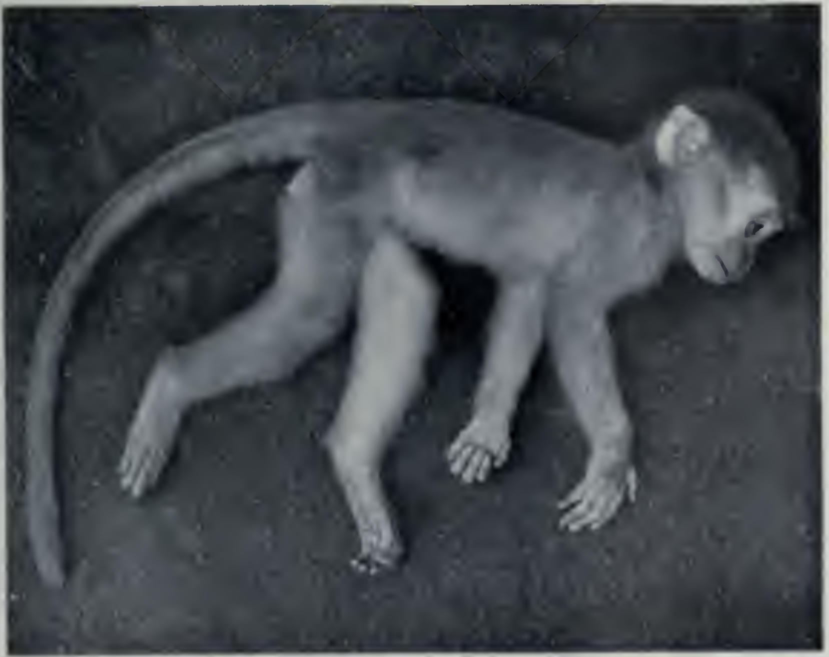

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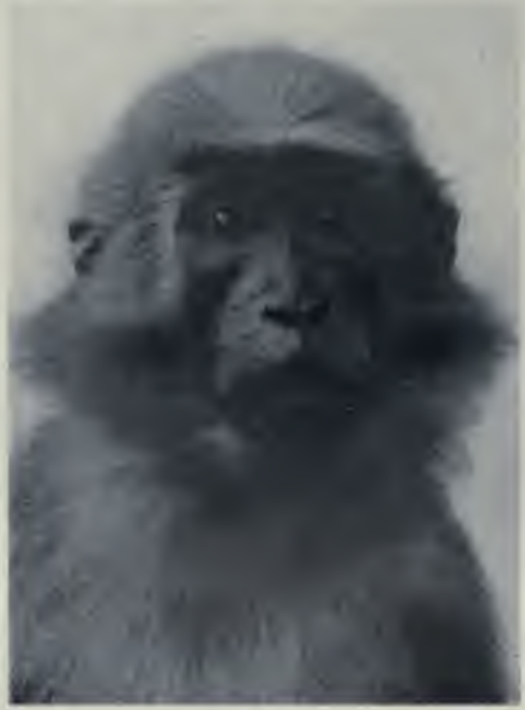
PLATE LXXXV

Cercocebus agilis Rivière

Male adult, Amer. Mus. No. 52634, Akenge, September 28, 1913. Total length of animal, 1280 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head. Same animal shown on Pl. LXXXIV, fig. 1.



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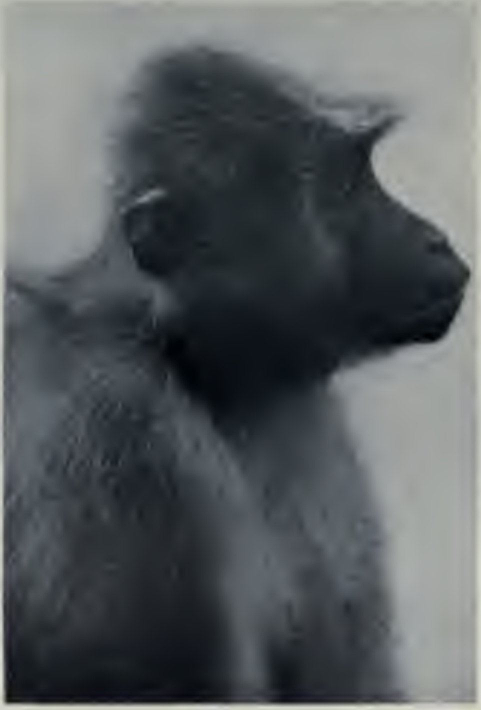

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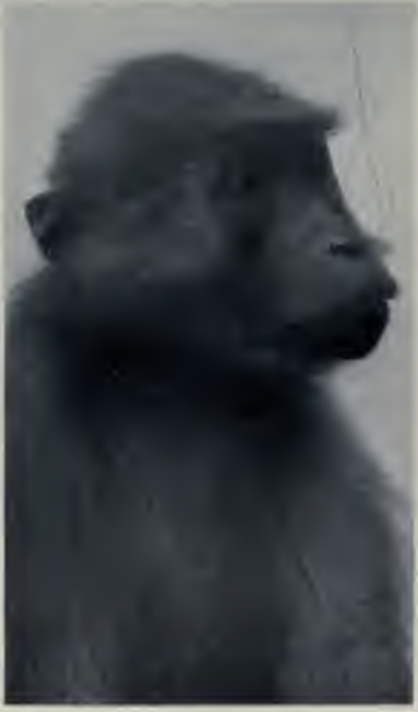

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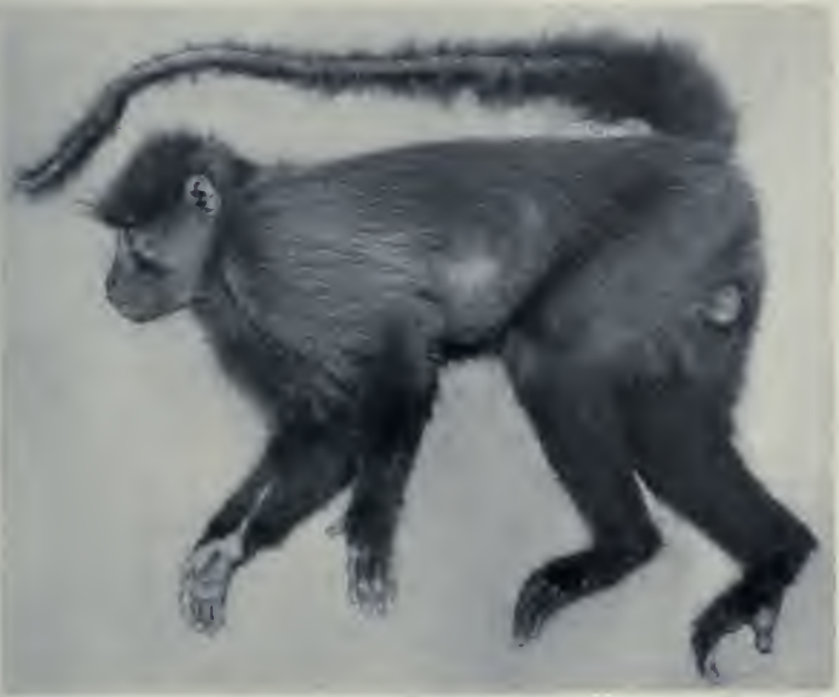
PLATE LXXXVI

Cercocebus albigena ituricus Matschie

Fig. 1. Male adult, Amer. Mus. No. 52619, Avakubi, August 22, 1914. Total length of animal, 1365 mm. Showing general body proportions. This monkey makes extensive use of its tail in climbing, as shown by the worn condition of the hair. Though the tail is not in any way prehensile, having no hairless tactile pads on its under side, as in some South American primates, it is often wrapped around branches in a semi-spiral manner to assist in securing a firmer hold in certain positions.

Fig. 2. Male juvenile, Amer. Mus. No. 52608, Akenge, October 6, 1913. Total length of animal, 570 mm. The relatively heavy tail is an indication of the increase of the muscular and sinewy attachments along the vertebræ which are used for climbing in later life. The hair of the tail in young specimens is quite smooth. Specimens in the flesh.



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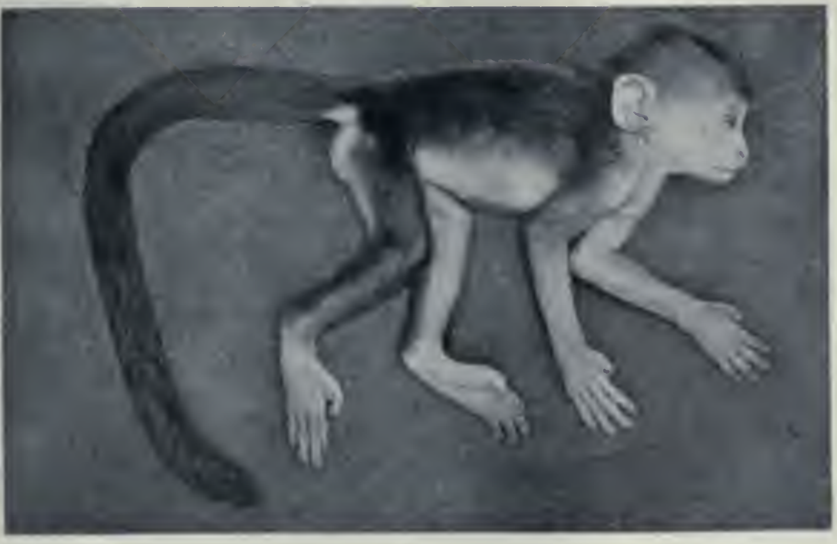

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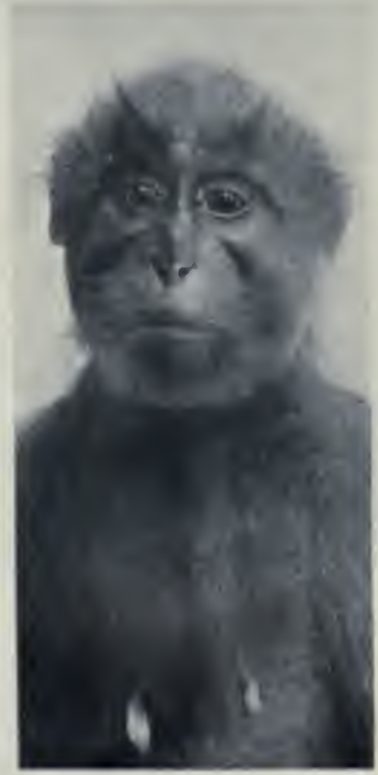
PLATE LXXXVII

Cercocebus albigena ituricus Matschie

Female adult, Amer. Mus. No. 52597, Akenge, September 29, 1913. Total length of animal, 1300 mm. Specimen in the flesh.

Figs. 1, 2 and 3. Front, side, and three-quarter views of head. The superciliary tufts are more strongly developed in males.



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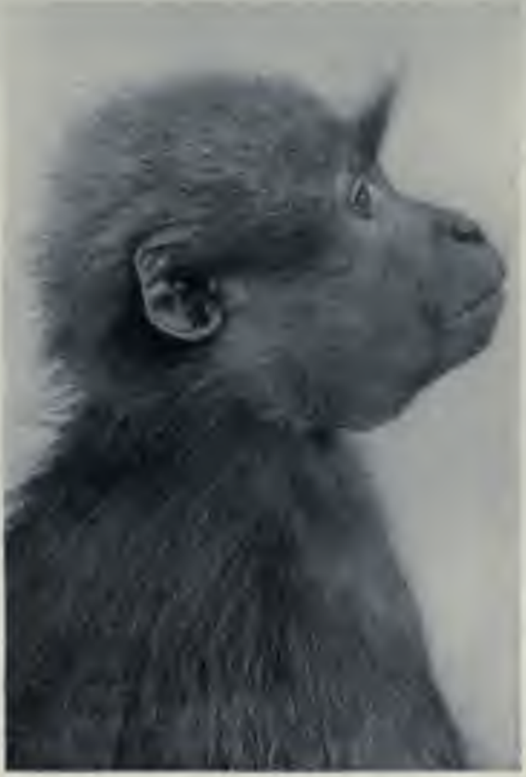

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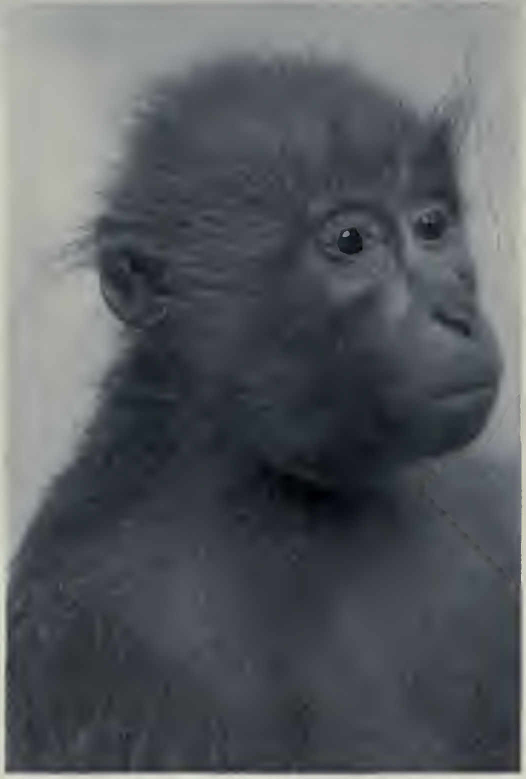

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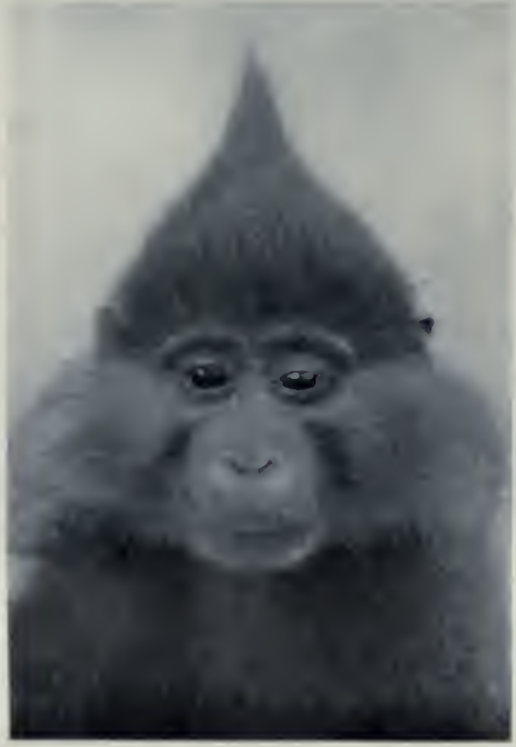
Plate LXXXVIII

Cercocebus aterrimus (Oudemans)

Male subadult, Amer. Mus. No. 52630, Stanleyville, November 1914. Total length of animal, 820 mm. Specimen in the flesh.

Figs. 1, 2 and 3. Front, side, and three-quarter views of head. The hairy, occipital crest can be moved slightly.



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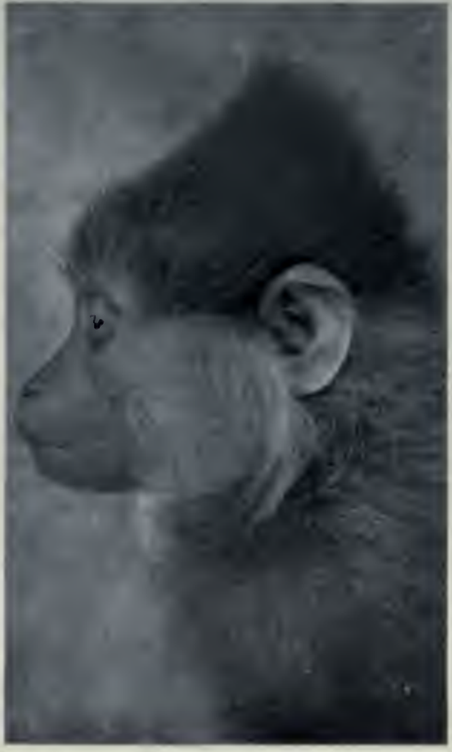

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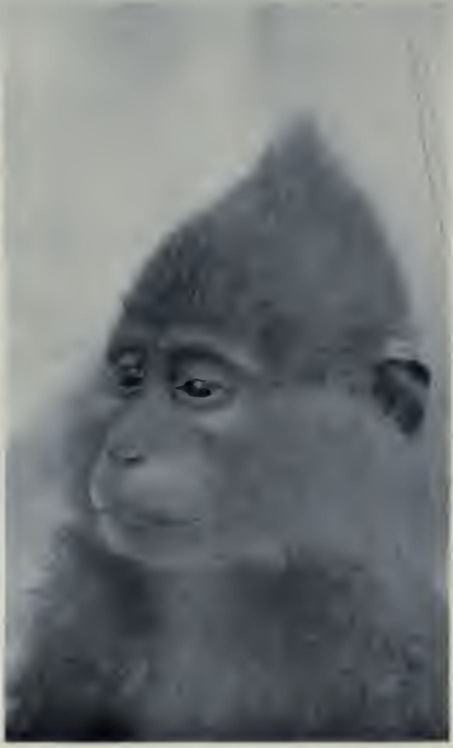

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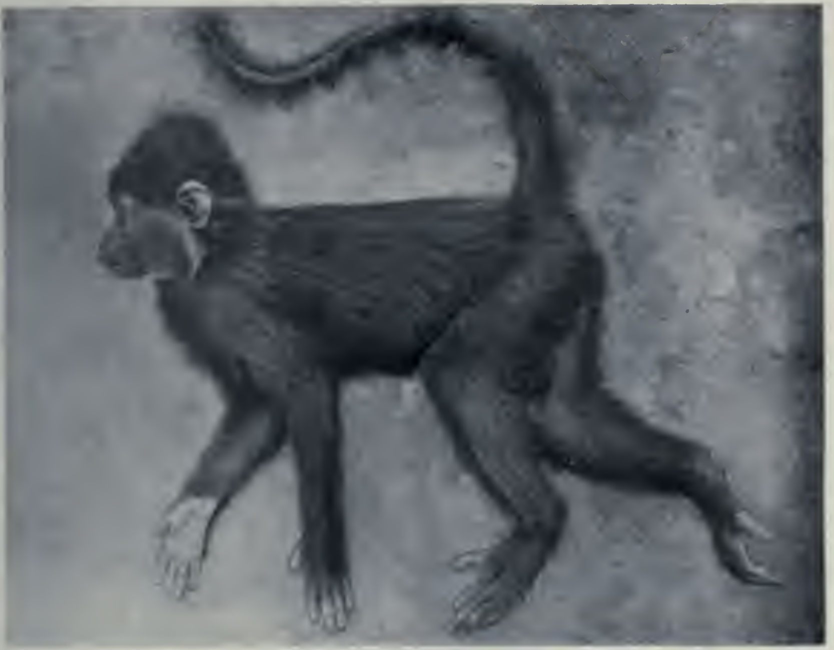
PLATE LXXXIX

Fig. 1. *Cercocebus aterrimus* (Oudemans). Male subadult, Amer. Mus. No. 52630, Stanleyville, November 1914. Total length of animal, 820 mm. Showing general body proportions. This specimen also shows that in the genus *Cercocebus* the tail is used as a rudimentary prehensile organ.

Fig. 2. *Rhinostigma hamlyni* (Pocock). Female subadult, Amer. Mus. No. 52463, considerably south of Stanleyville, September 21, 1913. Total length of animal, 700 mm. Showing general body proportions. On account of its nocturnal habits, called by the natives the 'Owl Monkey." Specimens in the flesh.



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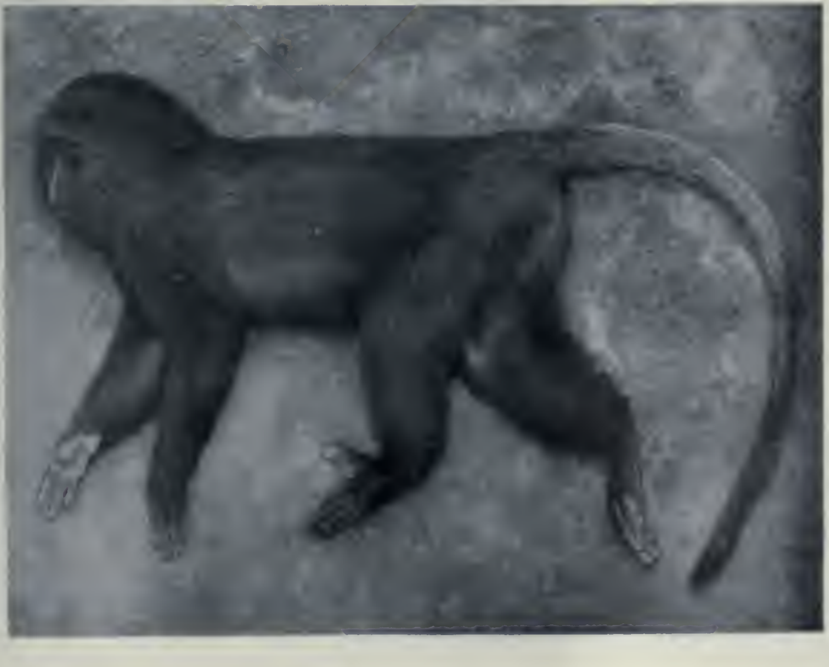

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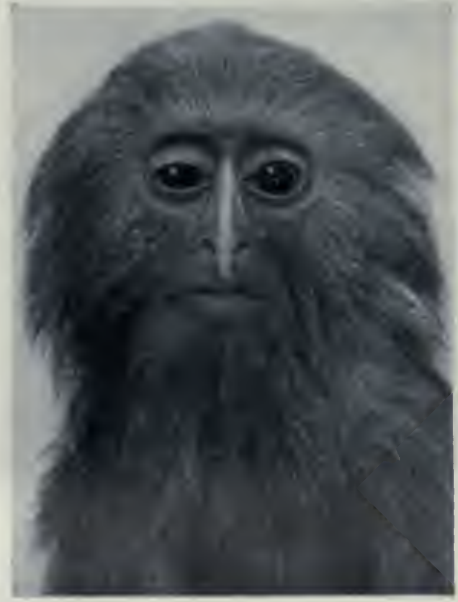
PLATE XC

Rhinostigma hamlyni (Pocock)

Female subadult, Amer. Mus. No. 52463, considerably south of Stanleyville September 21, 1913. Total length of animal, 700 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head. The short rostrum, the peculiar white nose-streak from between the eyes to the mouth, and the long hair hanging over the sides of the head contribute greatly to the owl-like appearance of the face.



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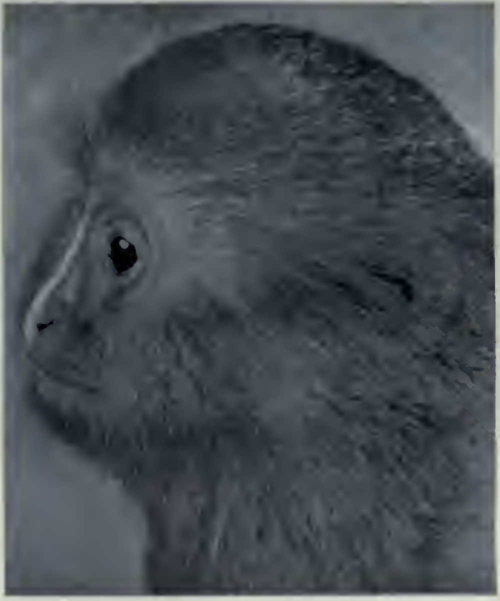

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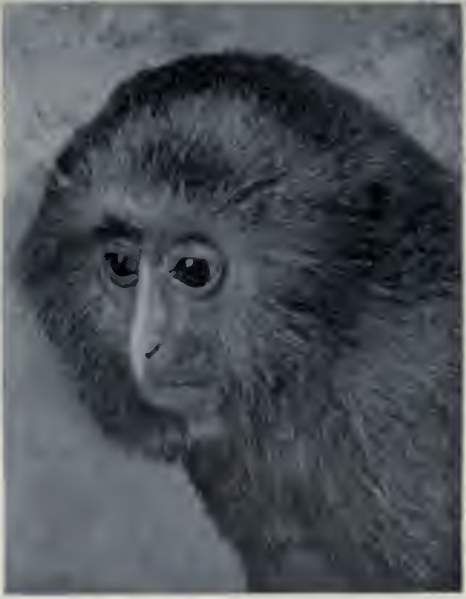

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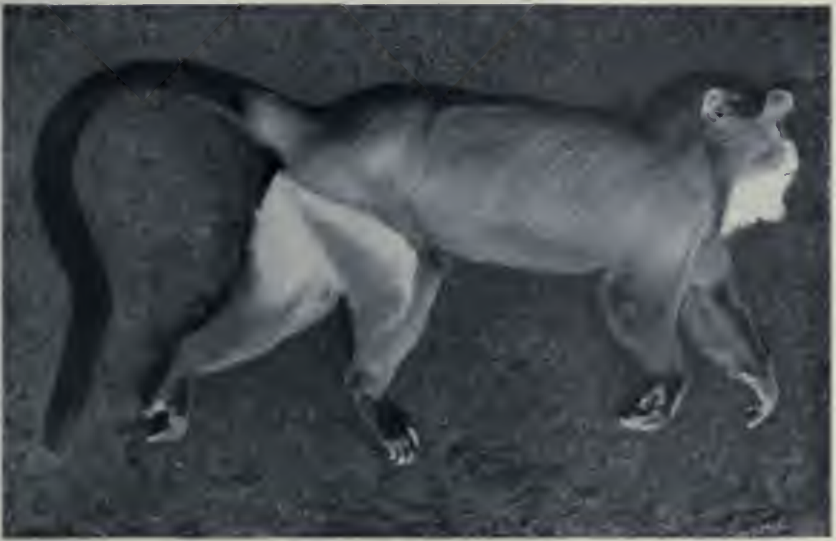
Plate XCI

Lasiopyga brazzæ uelensis (Lönnberg)

Fig. 1. Male adult, Amer. Mus. No. 52431, Niangara, April 10, 1913. Total length of animal, 1310 mm. Showing general body proportions as compared with the young male below.

Fig. 2. Male juvenile, Amer. Mus. No. 51025, Niangara, June 10, 1913. Total length of animal, 520 mm. Specimens in the flesh.



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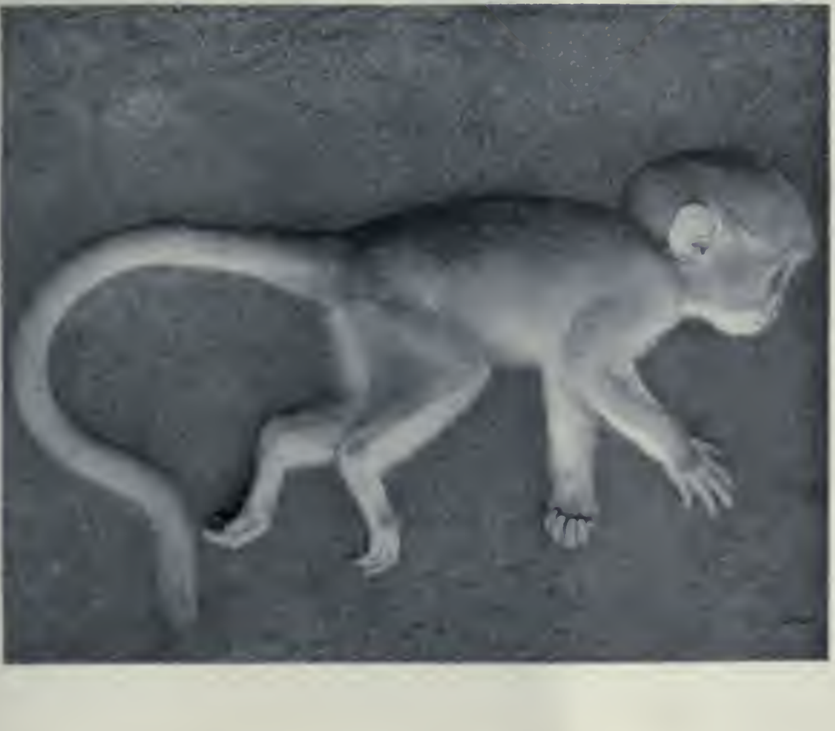

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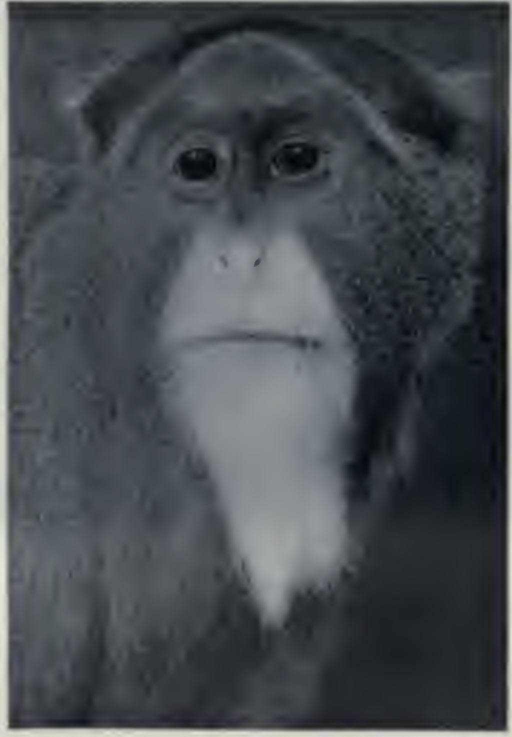
Plate XCII

Lasiopyga brazzæ uelensis (Lönnberg)

Figs. 1 and 2. Male adult, Amer. Mus. No. 52443, Niapu, December 7, 1913. Total length of animal, 1260 mm. Front and side views of head. The beard in this species is more highly developed in males.

Fig. 3. Male adult, Amer. Mus. No. 52431, Niangara, April 10, 1913. Total length of animal, 1310 mm. Three-quarter view of head. The relative development of the light brow-band and the sharp demarcation of the dark crown-patch vary with the individual. Specimens in the flesh.



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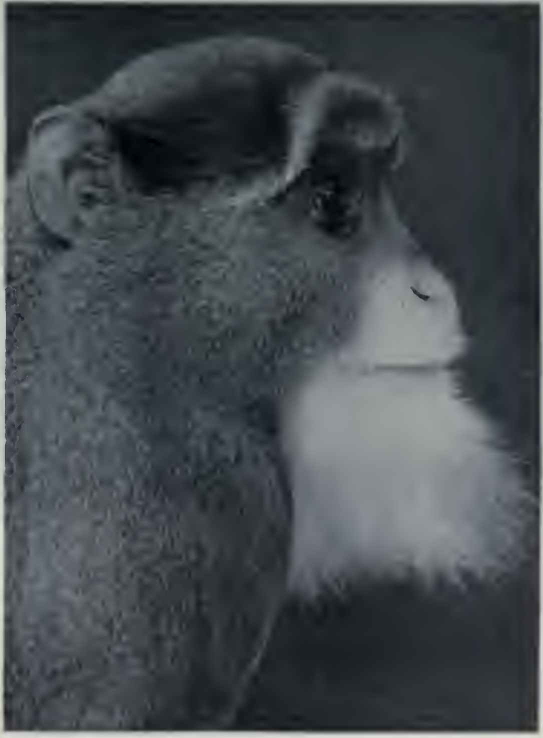

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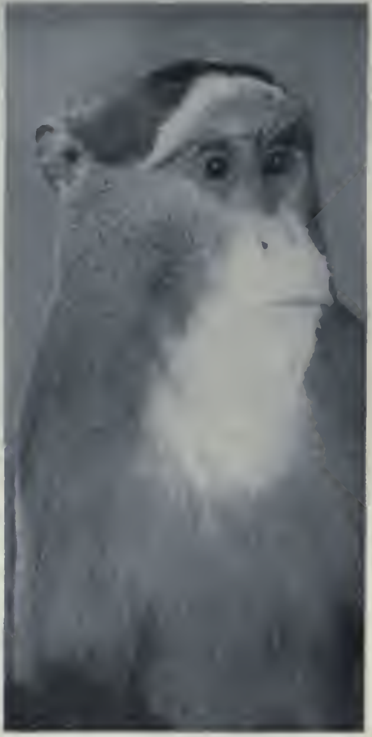

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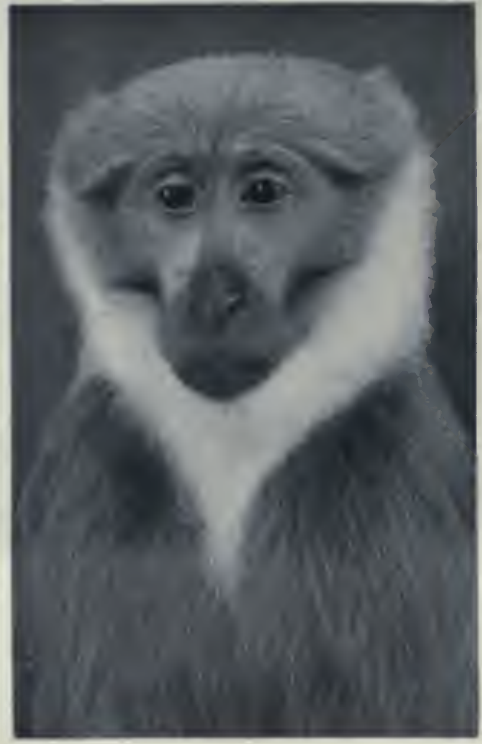
Plate XCIII

Lasiopyga l'hœsti l'hœsti (Sclater)

Male adult, Amer. Mus. No. 52452, Babeyru, July 14, 1914. Total length of animal, 1300 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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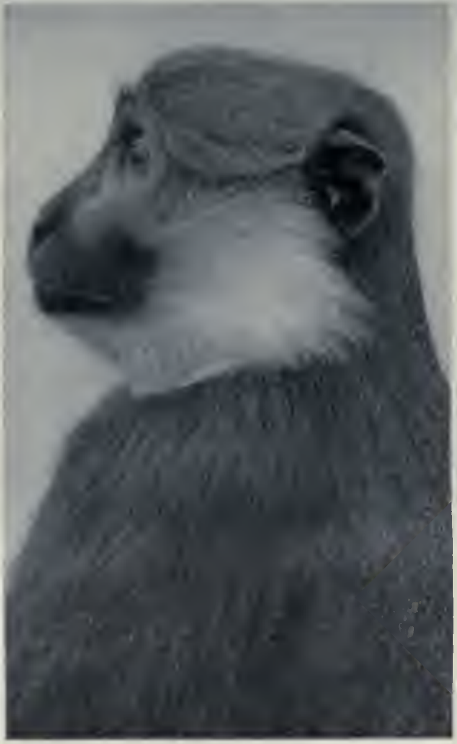

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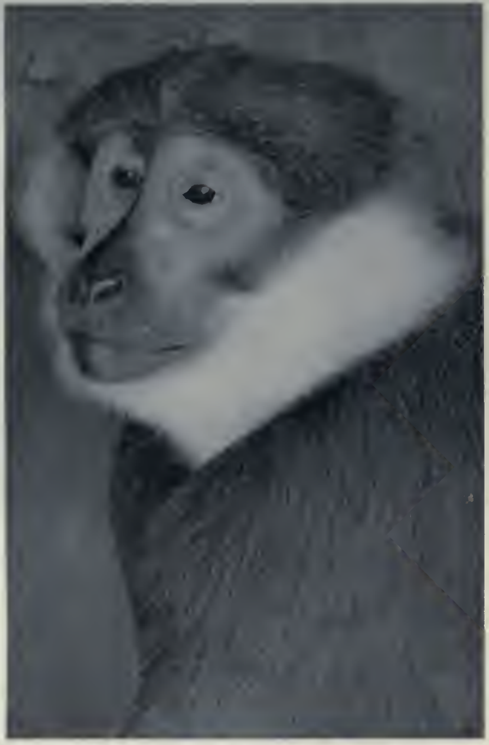

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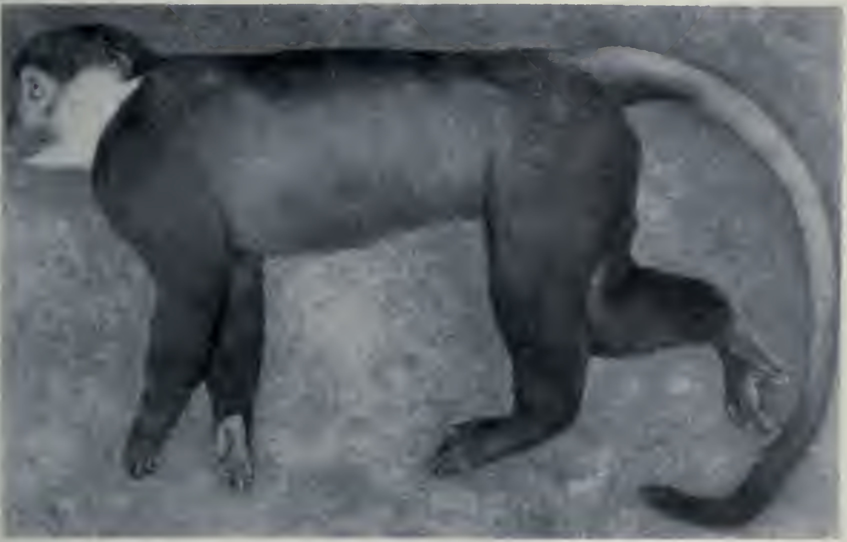
PLATE XCIV

Fig. 1. *Lasiopyga l'hœsti l'hœsti* (Sclater). Male adult, Amer. Mus. No. 52452, Babeyru, July 14, 1914. Total length of animal, 1300 mm. Showing general body proportions. This is one of the few partly terrestrial primates in the West African Rain Forest. Near native settlements it often plunders the rice fields.

Fig. 2. *Lasiopyga leucampyx stuhlmanni* (Matschie). Male adult, Amer. Mus. No. 52413, Niapu, January 29, 1914. Total length of animal, 1520 mm. One of the most common and well-furred monkeys of the forest of the northeastern Belgian Congo. Specimens in the flesh.



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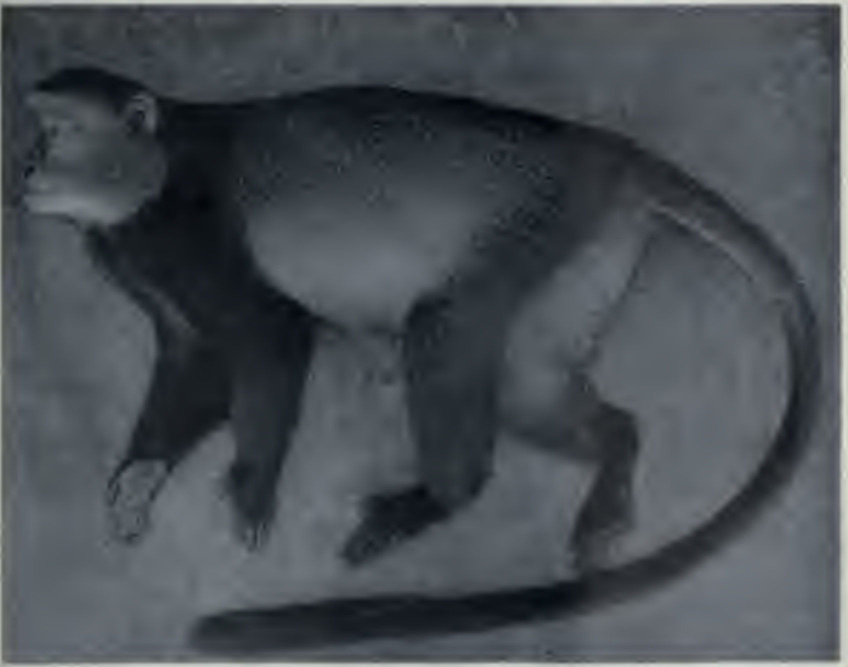

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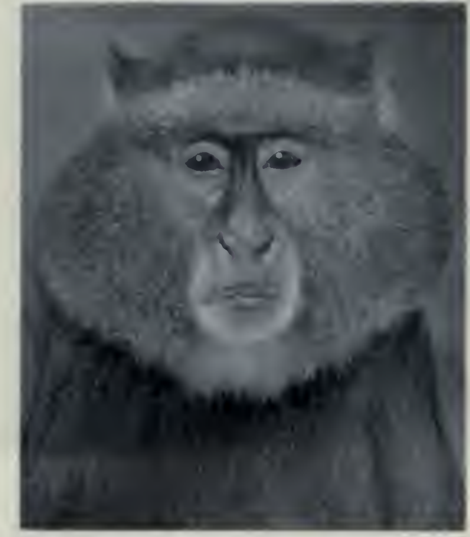
Plate XCV

Lasiopyga leucampyx stuhlmanni (Matschie)

Female adult, Amer. Mus. No. 52349, Akenge, September 13, 1913. Total length of animal, 1194 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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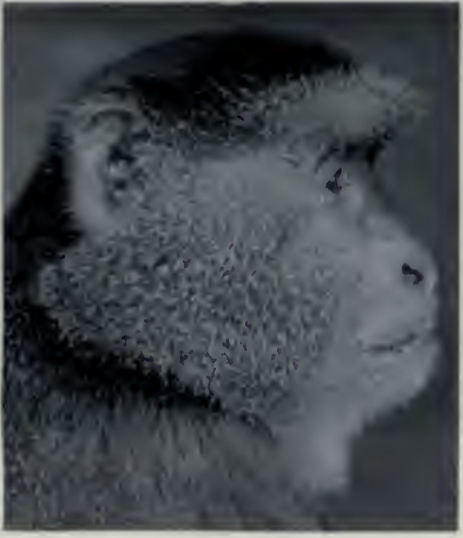

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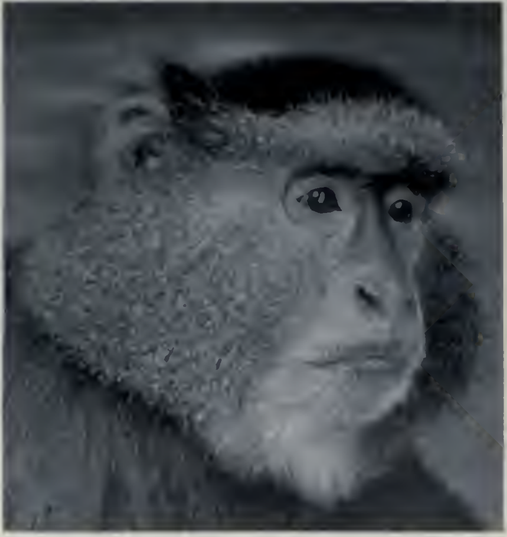

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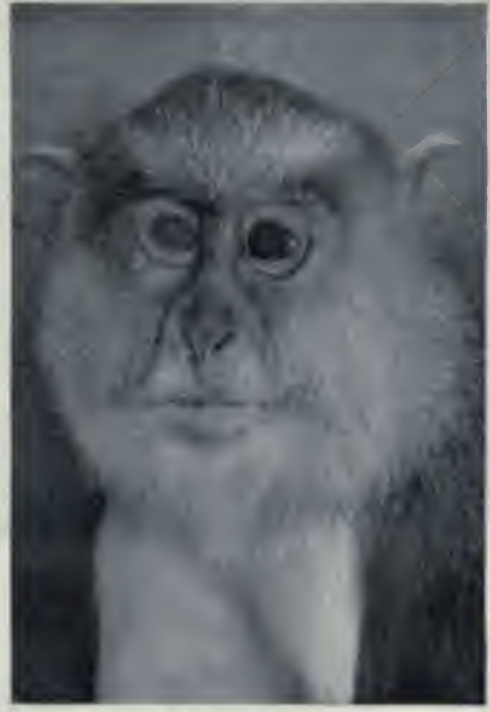
PLATE XCVI

Lasiopyga denti (Thomas)

Male adult, Amer. Mus. No. 52524, Niapu, January 12, 1914. Total length of animal, 1320 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head. The peculiar, light, curved ear-tuft and sharply set-off white underside and flanks distinguish this monkey.



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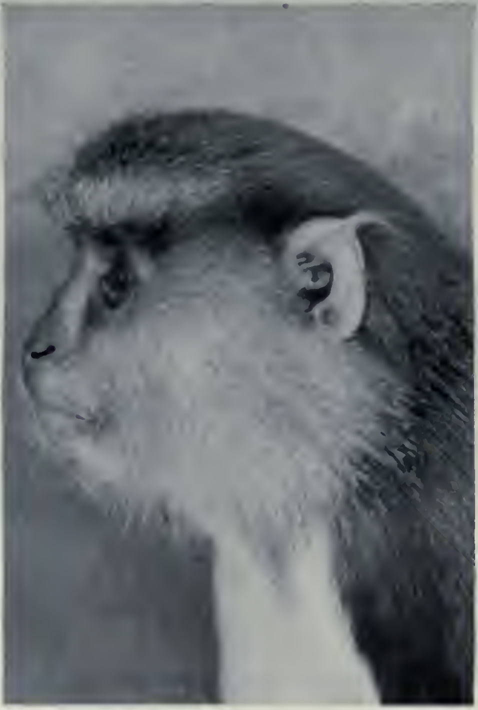

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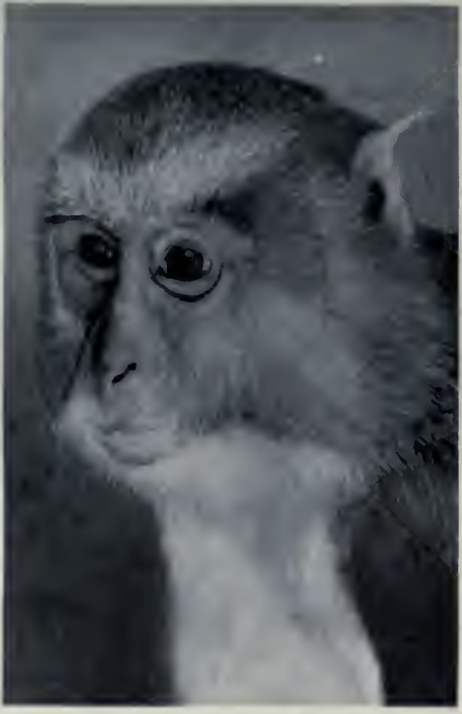

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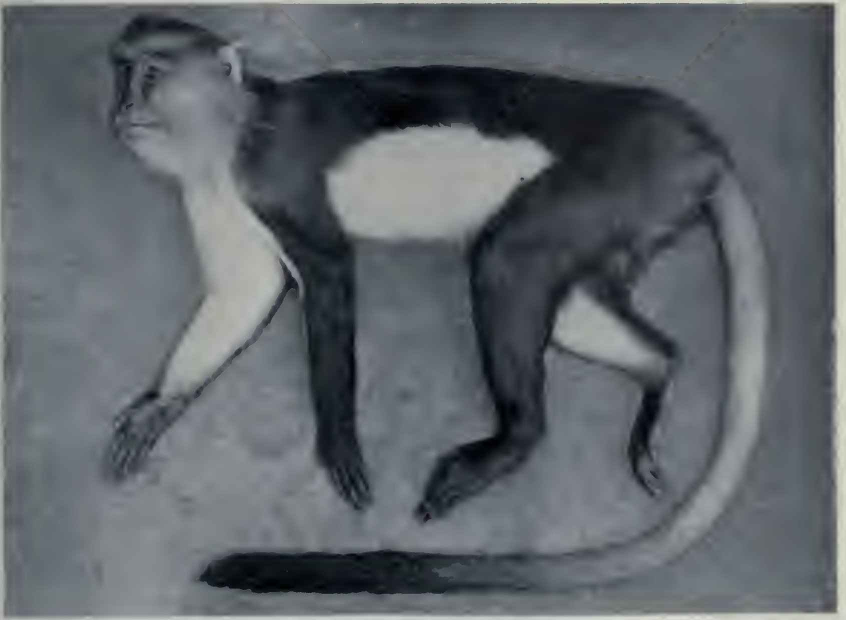
Plate XCVII

Fig. 1. *Lasiopyga denti* (Thomas). Male adult, Amer. Mus. No. 52524, Niapu, January 12, 1914. Total length of animal, 1320 mm. Showing general body proportions.

Fig. 2. *Lasiopyga ascanius cirrhorhinus* (Matschie). Avakubi, August 1914. Besides the remarkable facial markings, the long, reddish tail makes this monkey conspicuous. Specimens in the flesh.



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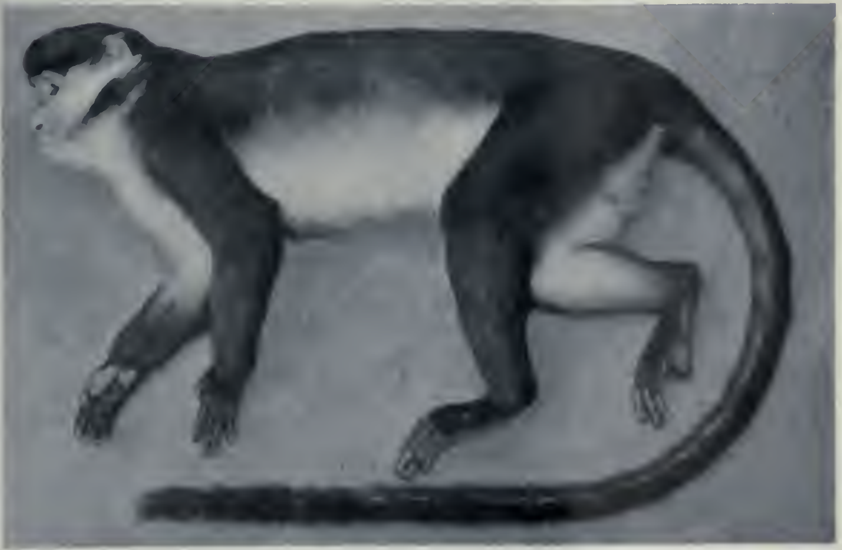

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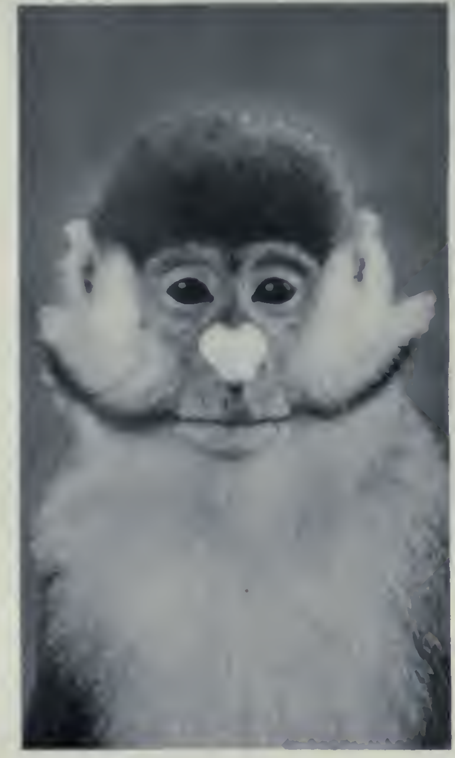
PLATE XCVIII

Lasiopyga ascanius cirrhorhinus (Matschie)

Figs. 1 and 2. Male adult, Niangara, June 1913. Front and side views of head. The white nose patch and the light, dark-edged whiskers, together with the bluish tint of the face, are truly remarkable features.

Fig. 3. Avakubi, August 1914. Three-quarter view of head. There is some slight individual variation in the color pattern of the face, as well as in the length of hair, especially in the whiskers. Specimens in the flesh.



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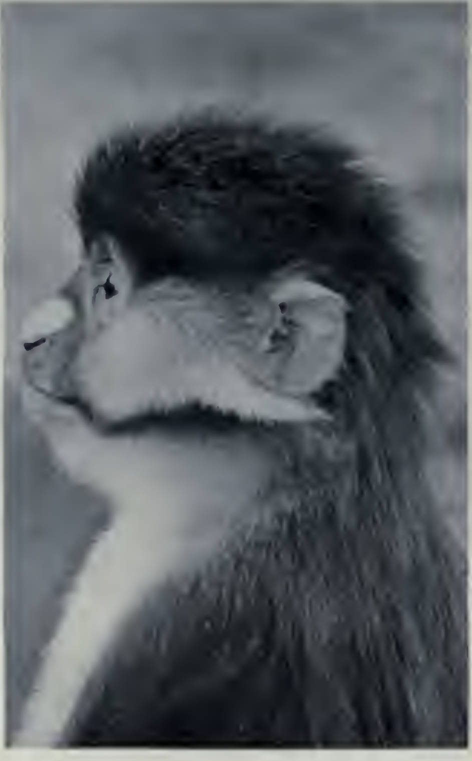

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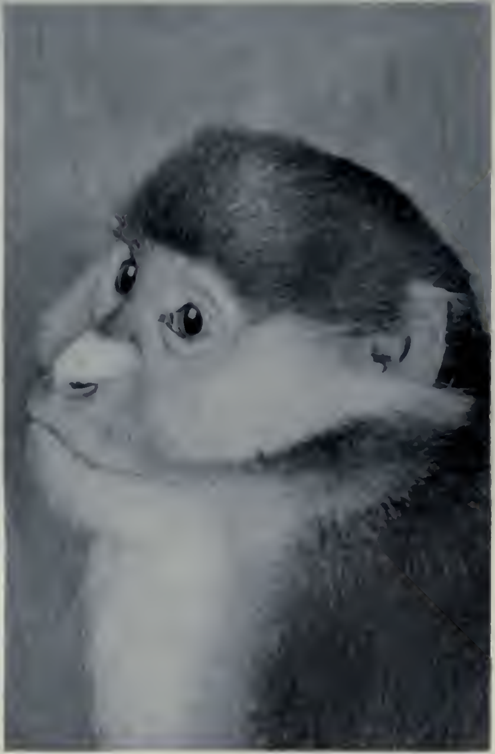

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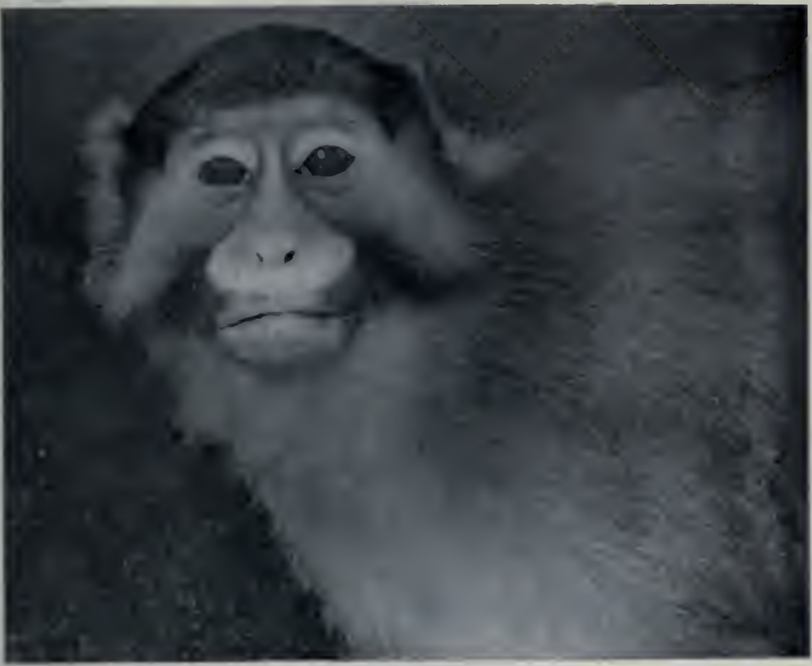
Plate XCIX

Lasiopyga cephus (Linnæus)

Male adult, Amer. Mus. No. 52569. Zambi, April 1915. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. In this form the peculiar pale yellow ear fringe, the considerably extended white nose patch, and the bluish face in life are the striking features. It has a gray underside and a partly red tail. Specimen in the flesh.



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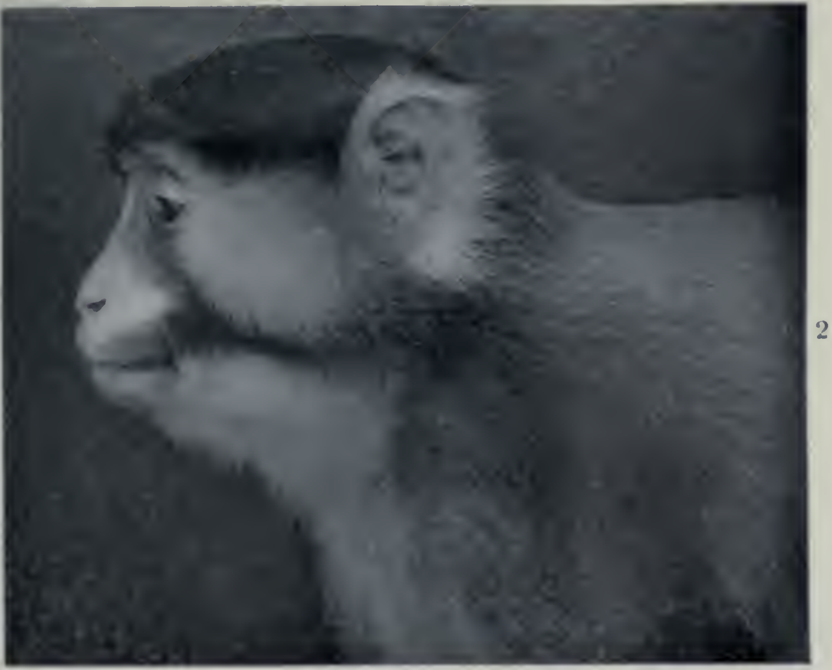

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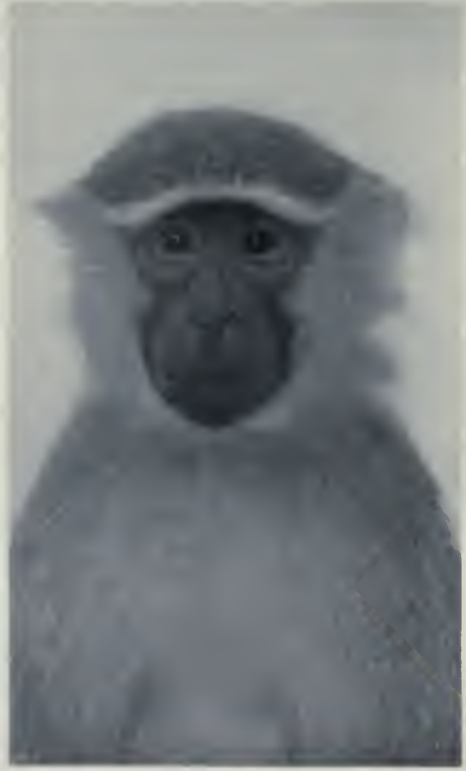
PLATE C

Lasiopyga pygerythra griseisticta (Elliot)

Male adult, Amer. Mus. No. 52478, Yakuluku, September 28, 1911. Total length of animal, 1015 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head. The black face and the long light whiskers turned up and back towards the ears are peculiar to this species that frequents partly forested Savannahs.



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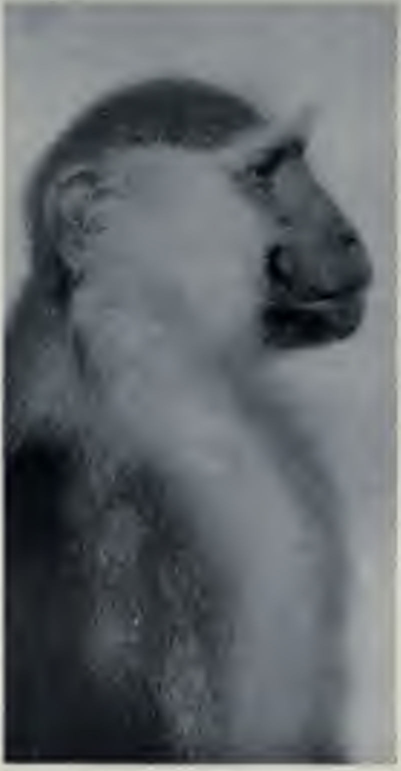

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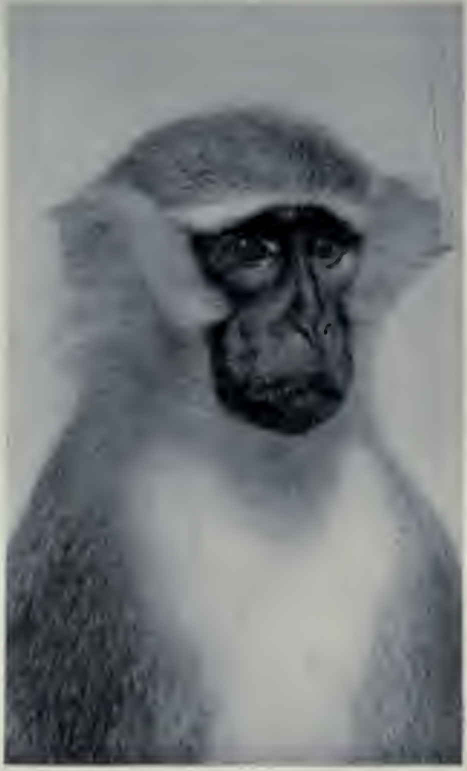

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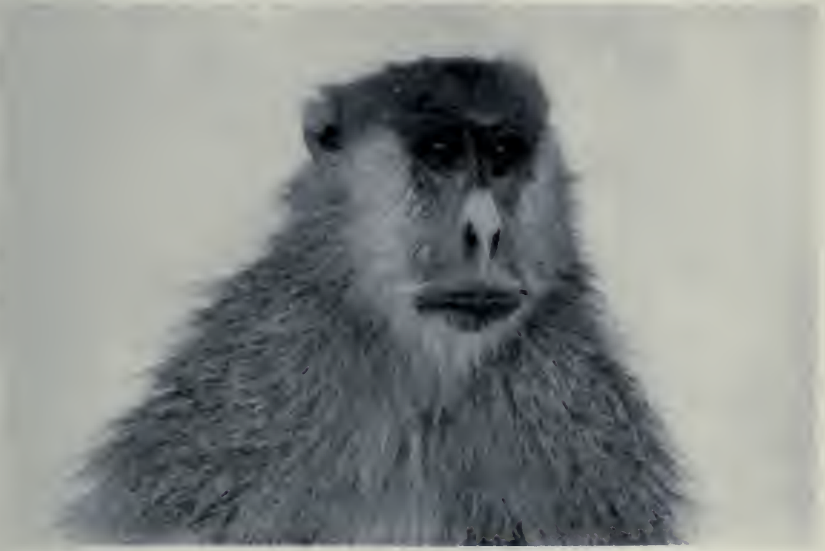
PLATE CI

Erythrocebus patas pyrronotus (Hemprich and Ehrenberg)

Male adult, Amer. Mus. No. 52576, Faradje, April 4, 1911. Total length of animal, 1195 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. The mane-like, long hair in adult males is particularly characteristic.



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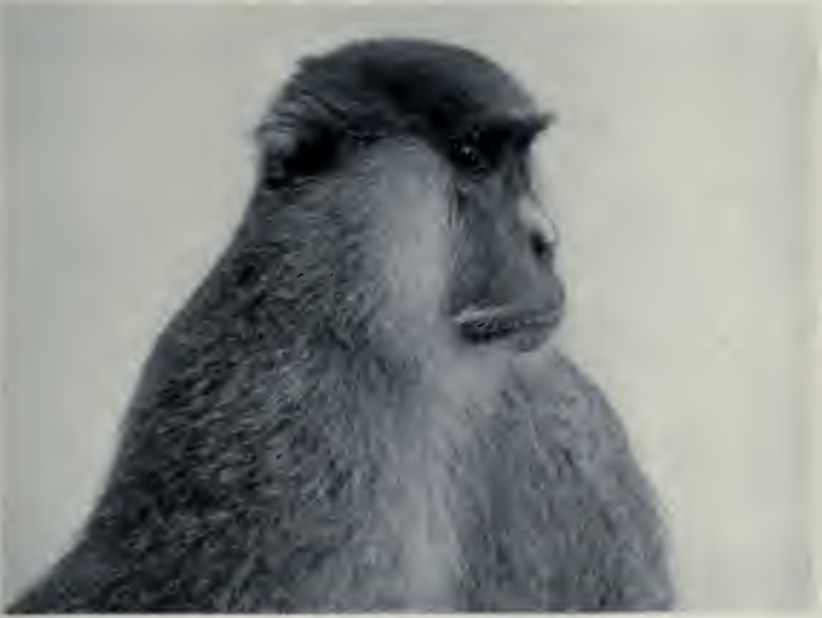

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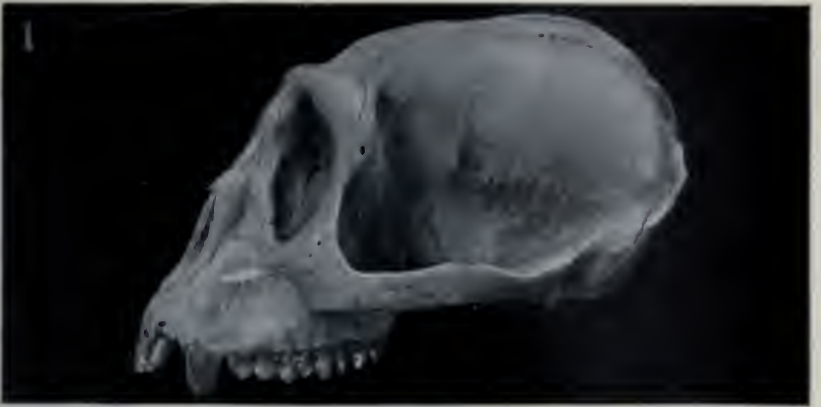
PLATE CII

Colobus langi, new species

Type skull, male adult, Amer. Mus. No. 52290, Risimu, September 8, 1909. Greatest length of skull, 105.8 mm.

Fig. 1. Left lateral view; Fig. 2, dorsal view; Fig. 3, palatal view.

1



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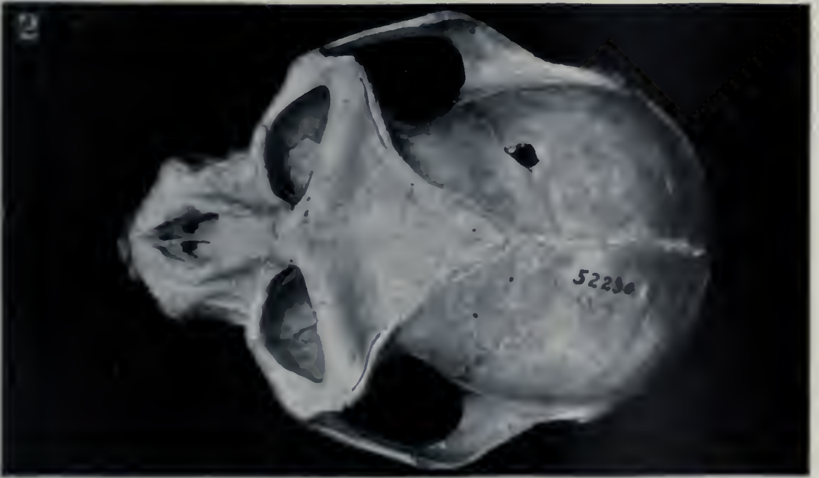

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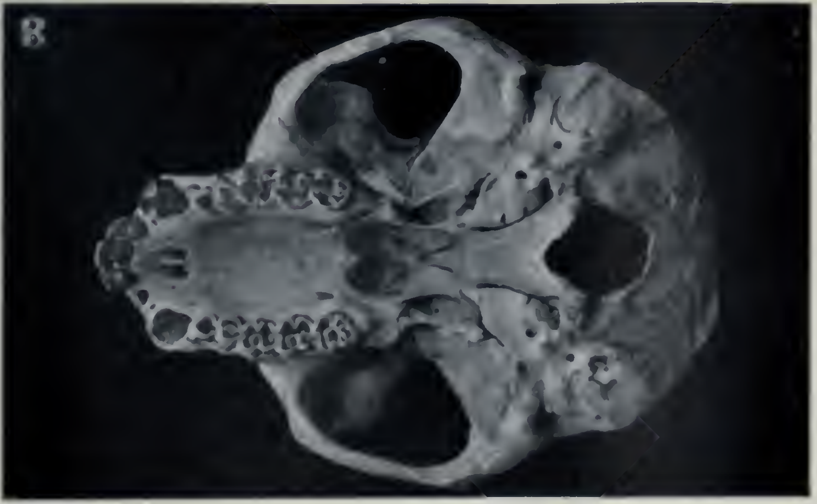
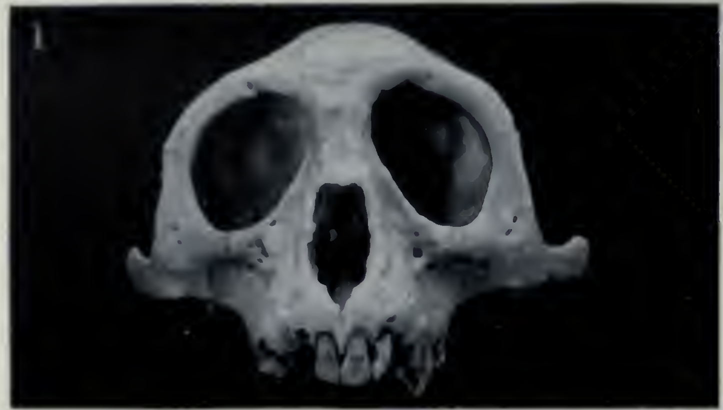


PLATE CIII

Colobus langi, new species

Type skull and mandible, male adult, Amer. Mus. No. 52290, Risimu, September 8, 1909. Greatest length of skull, 105.8 mm.

Fig. 1, front view; Fig. 2, occipital view; Fig. 3, crown view of mandible; Fig. 4, left lateral view of mandible.



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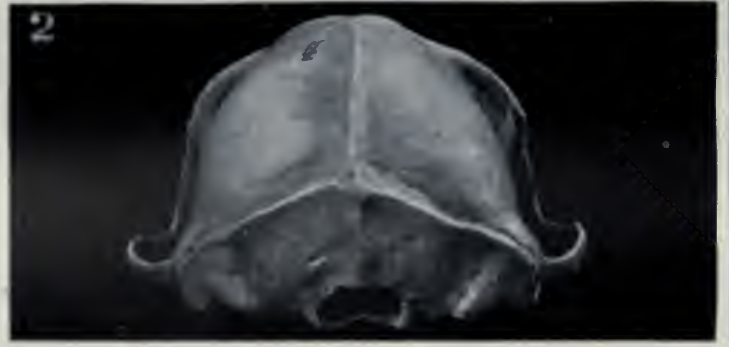

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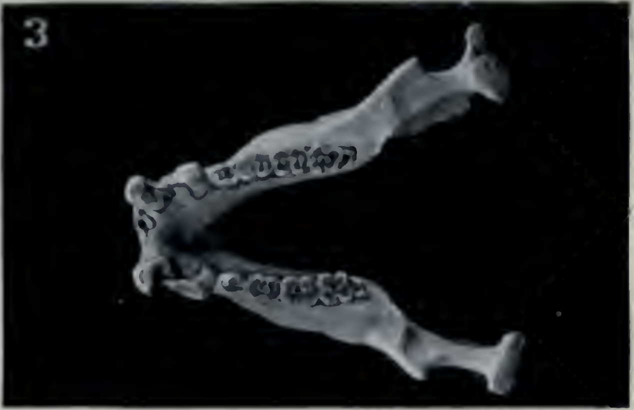

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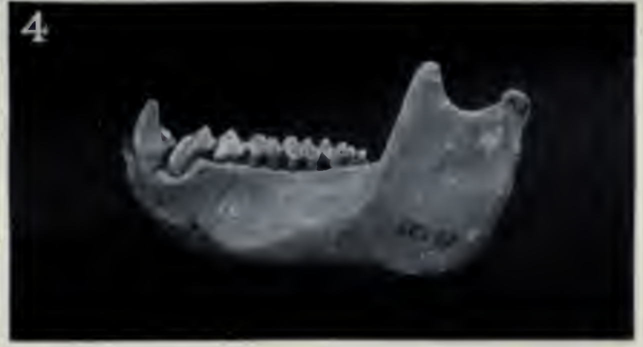

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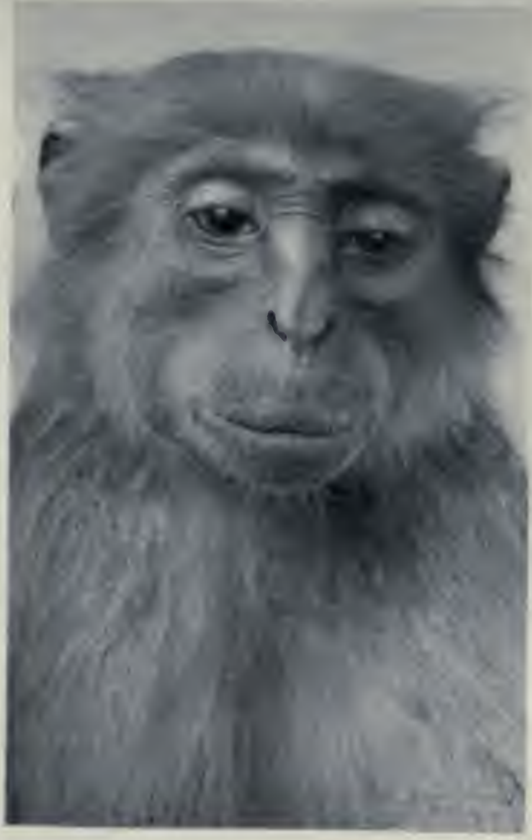
PLATE CIV

Colobus powelli powelli Matschie

Female adult, Amer. Mus. No. 52259, Akenge, September 27, 1913. Total length of animal, 1240 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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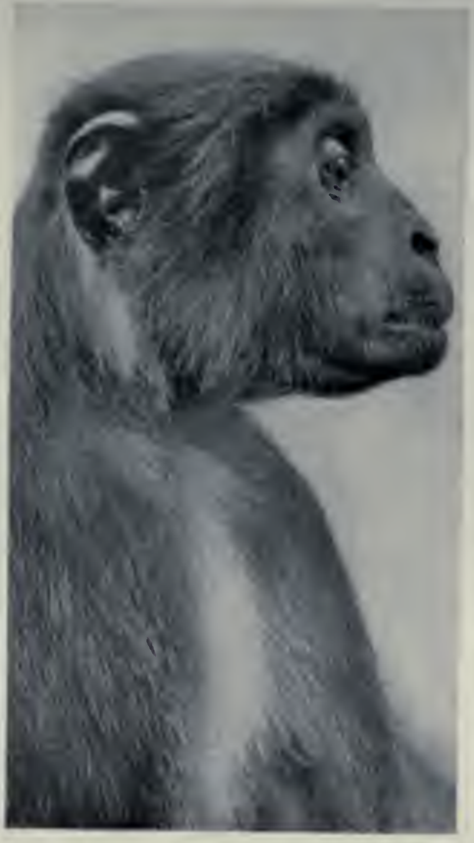

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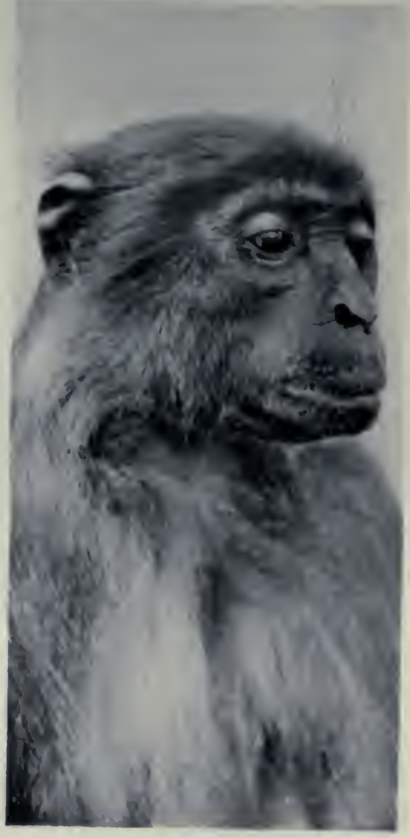

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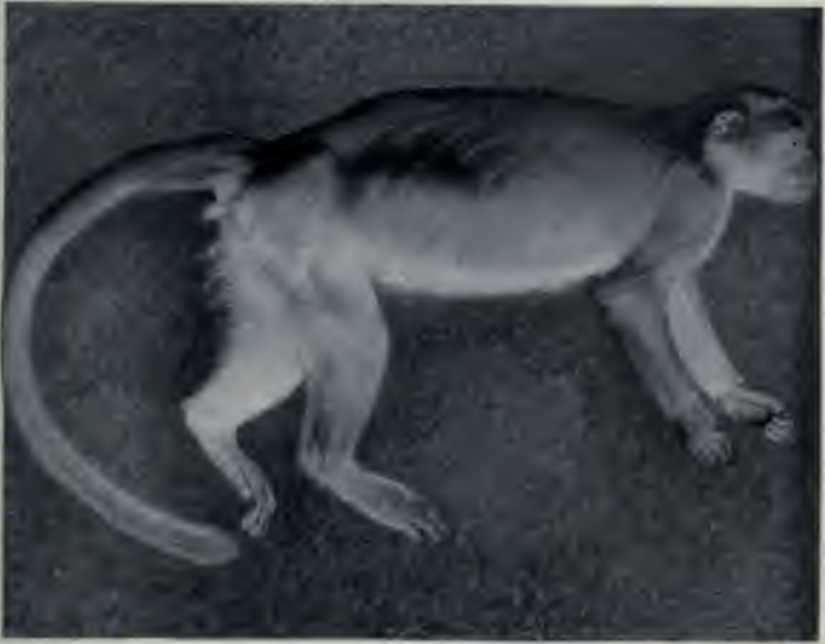
PLATE CV

Fig. 1. *Colobus powelli powelli* Matschie. Female adult, Amer. Mus. No. 52259, Akenge, September 27, 1913. Total length of animal, 1240 mm. Specimen in the flesh. Lateral view showing general body proportions.

Fig. 2. *Colobus powelli brunneus* Lönnberg. Male adult, Amer. Mus. No. 52303, Faradje, November 26, 1911. Total length of animal, 1310 mm. Anal region, showing the peculiar extrusion, about the size of an apple, just above and between the ischial callosities. *e*, extrusion; *hl*, hindlimb; *is*, ischial callosity; *sc*, scrotum; *t*, tail.



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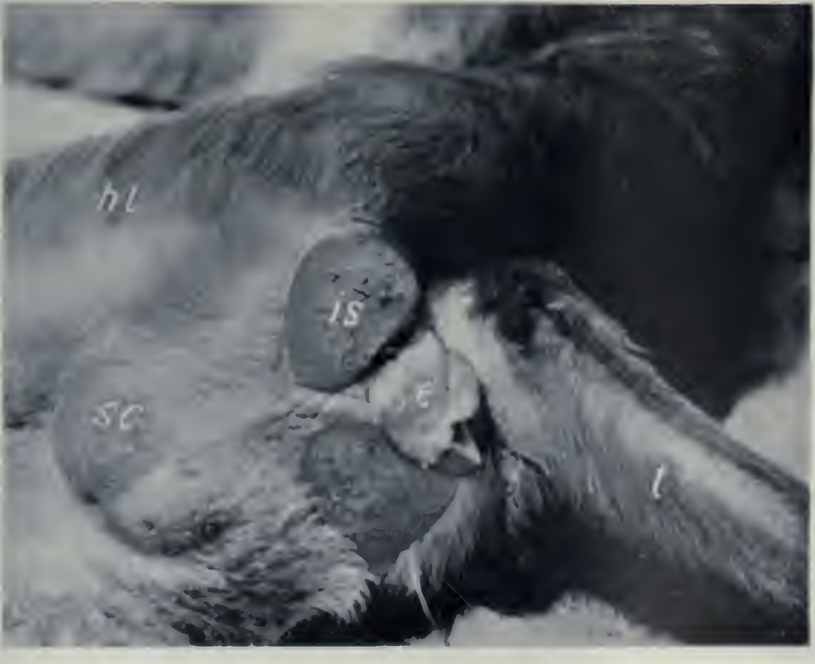

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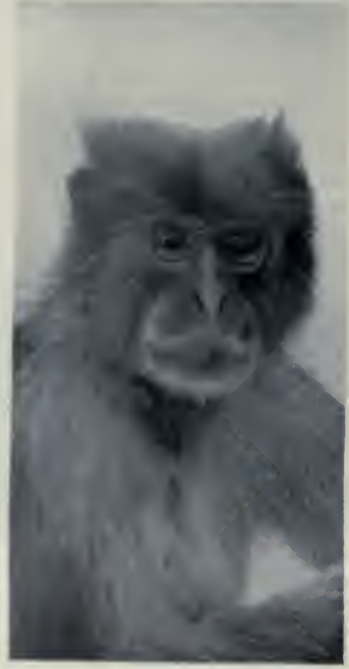
Plate CVI

Colobus powelli brunneus Lönnberg

Figs. 1 and 2. Male adult, Amer. Mus. No. 52303, Faradje, November 26, 1911. Total length of animal, 1310 mm. Front and side views of head. Characteristic are the peculiar parting of the hair on the crown and its lengthening on the lateral portion above the ears, forming a whirl, which is well shown in the figure to the extreme right.

Fig. 3. Female adult, Amer. Mus. No. 52301, Faradje, July 23, 1911. Total length of animal, 1295 mm. Side view of head. Specimens in the flesh.



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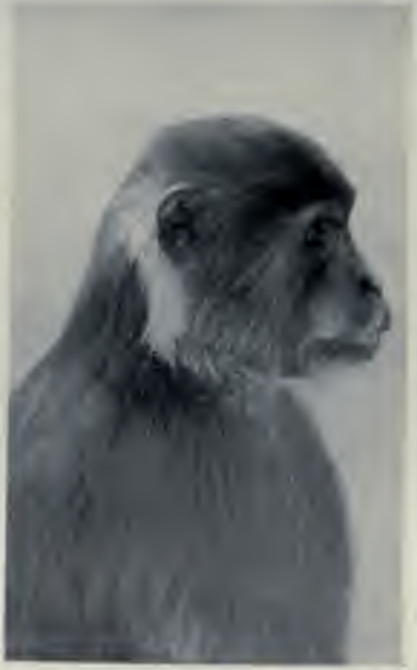

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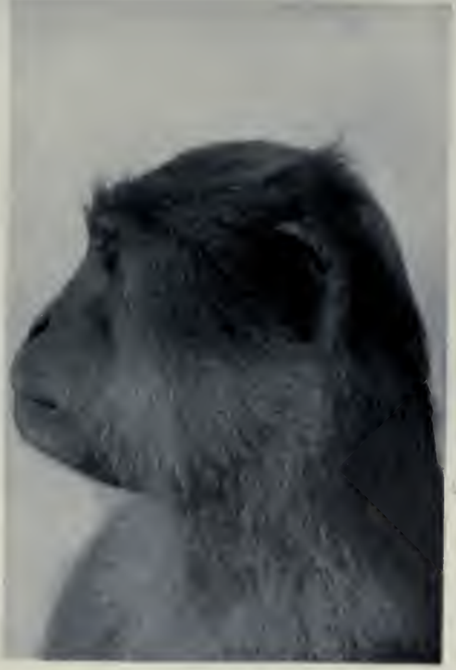

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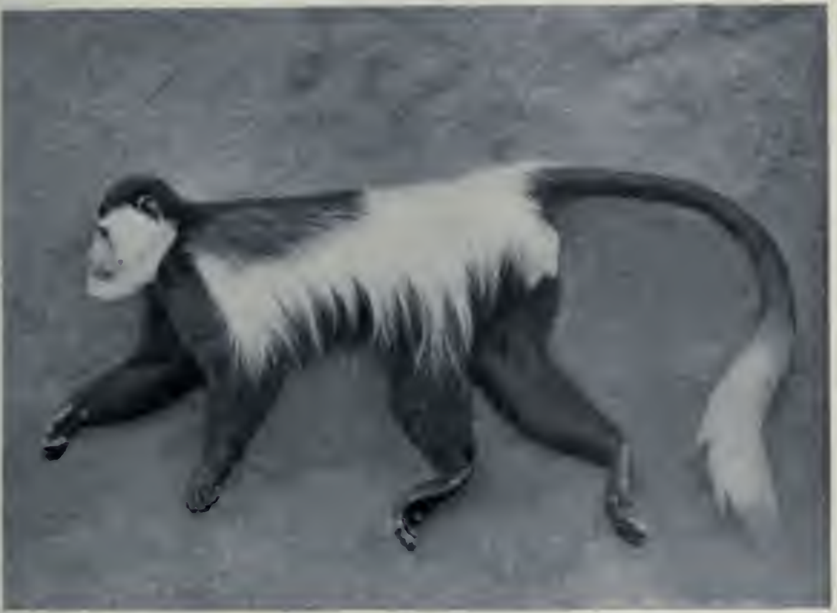
PLATE CVII

Colobus abyssinicus ituricus Matschie

Fig. 1. Male adult, Amer. Mus. No. 52240, Faradje, December 10, 1911. Total length of animal, 1400 mm. Showing general body proportions and relative length of fur.

Fig. 2. Male juvenile, Amer. Mus. No. 52230, Faradje, February 28, 1911. Total length of animal, 540 mm. Newly born specimens are practically white, but they surprisingly soon change to the adult pelage. Specimens in the flesh.



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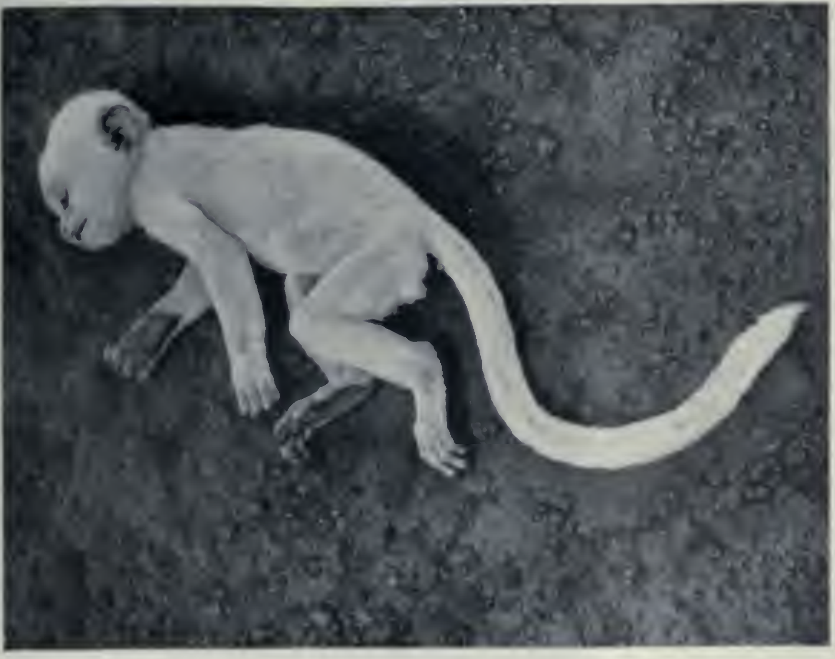

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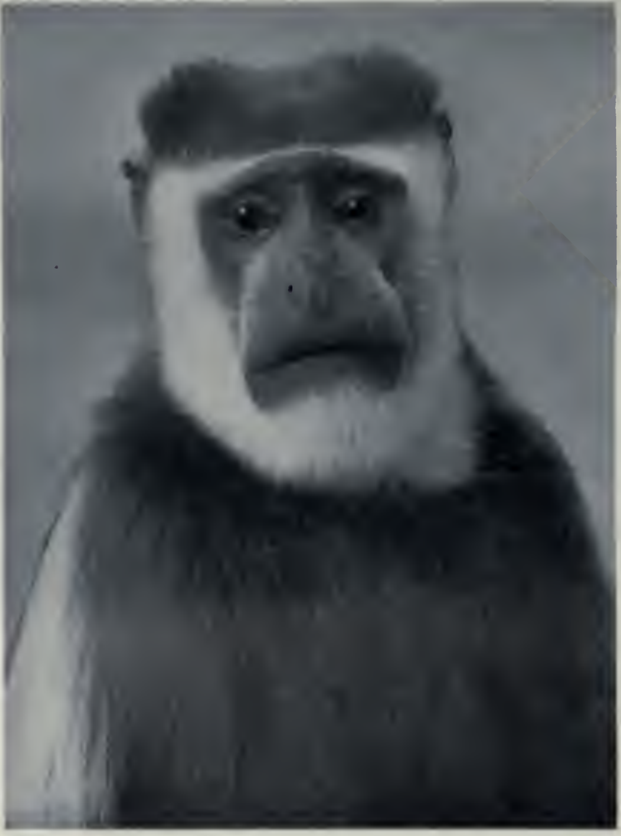
PLATE CVIII

Colobus abyssinicus ituricus Matschie

Male adult, Amer. Mus. No. 52251, Faradje, October 31, 1912. Total length of animal, 1310 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. These monkeys feed chiefly on young leaves, shoots, and other green vegetable matter; and the relatively thick lips make the mouthparts appear heavier.



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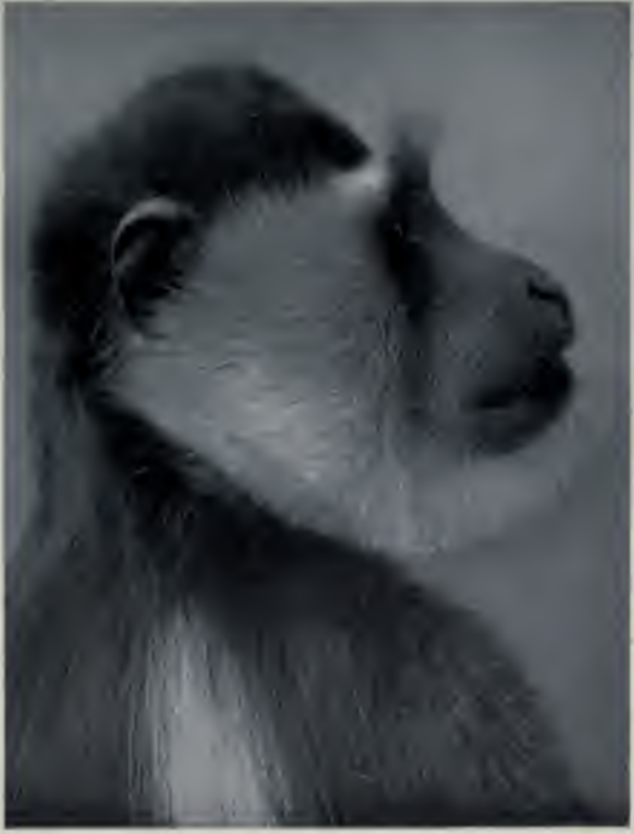

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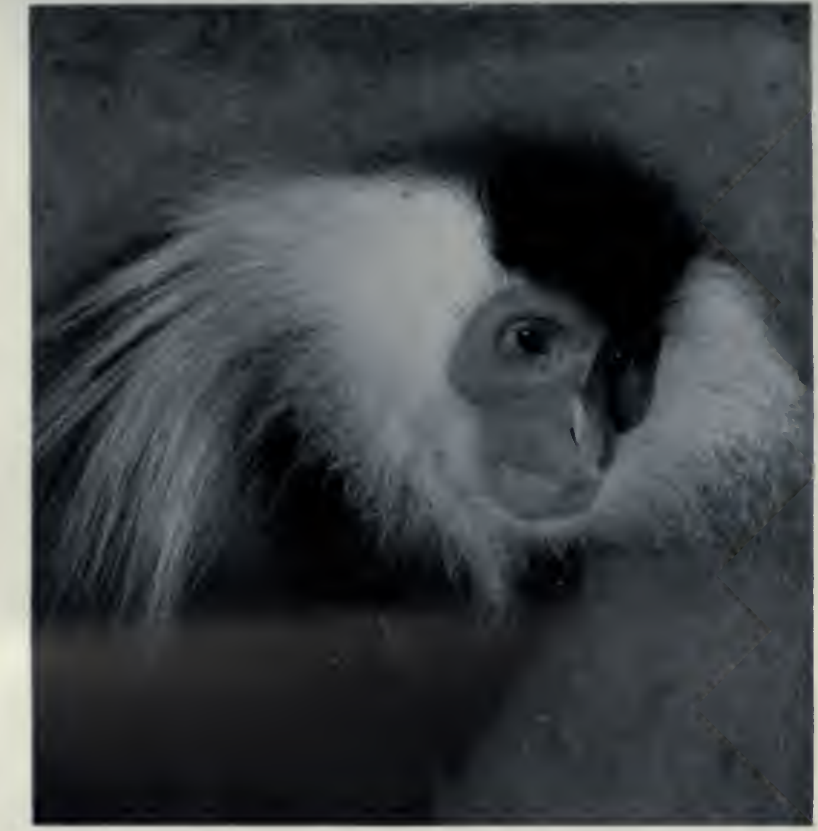
Plate CIX

Fig. 1. *Colobus angolensis cottoni* Lydekker. Female adult, Amer. Mus. No. 52142, Akenge, September 30, 1913. Total length of animal, 1390 mm. Three-quarter view of head.

Fig. 2. *Colobus abyssinicus ituricus* Matschie. Male adult, Amer. Mus. No. 52251, Faradje, October 31, 1912. Total length of animal, 1310 mm. Three-quarter view of head. Specimens in the flesh.



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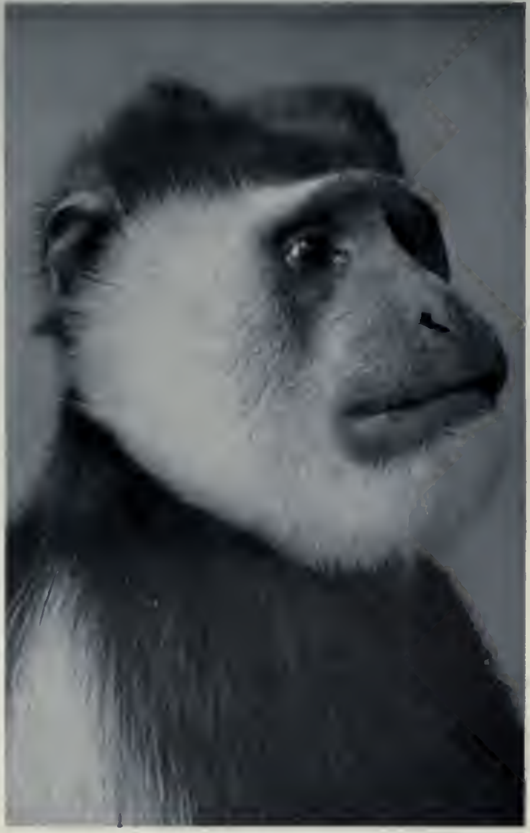

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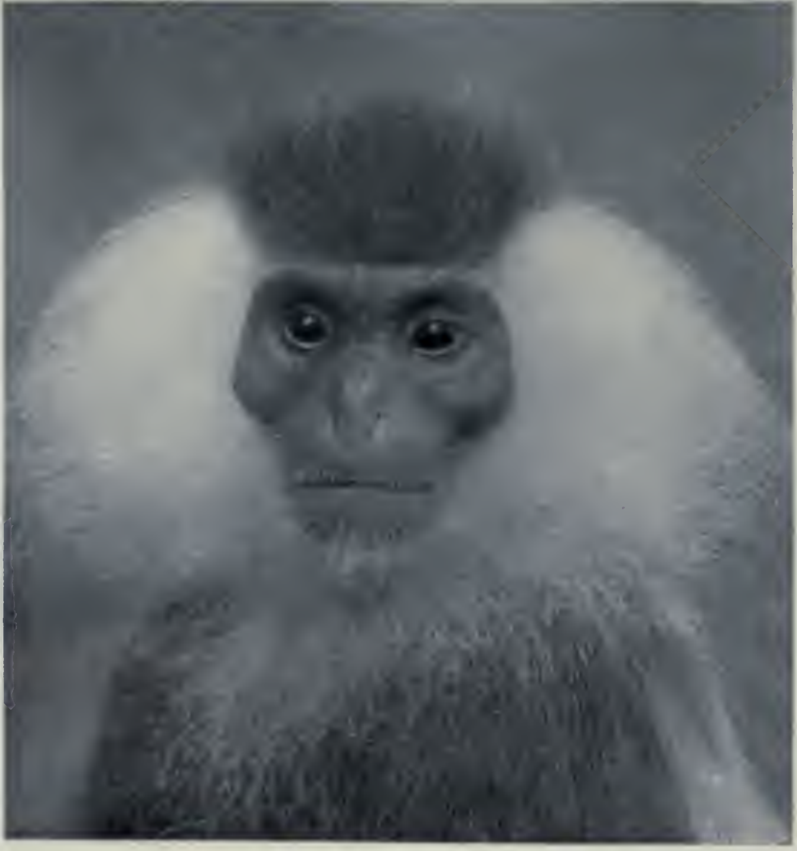
PLATE CX

Colobus angolensis cottoni Lydekker

Female adult, Amer. Mus. No. 52142, Akenge, September 30, 1913. Total length of animal, 1390 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. The exceptionally long, fluffy, white whiskers against the silky black coat forms a striking contrast.



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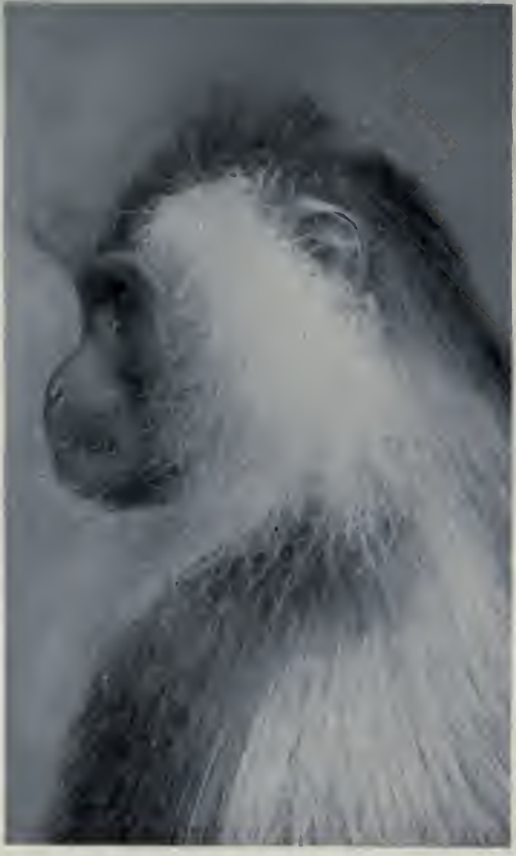

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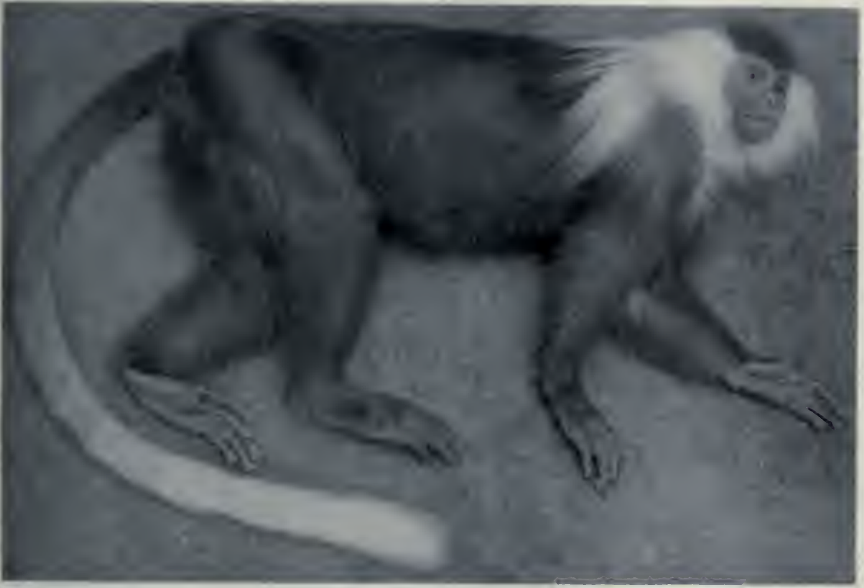
PLATE CXI

Colobus angolensis cottoni Lydekker

Fig. 1. Female adult, Amer. Mus. No. 52142, Akenge, September 30, 1913. Total length of animal, 1390 mm. Showing general body proportions.

Fig. 2. Female juvenile, Amer. Mus. No. 52178, Niapu, November 12, 1913. Total length of animal, 490 mm. At birth the young in all the black-and-white, and even in the reddish *Colobus* collected are whitish. Specimens in the flesh.



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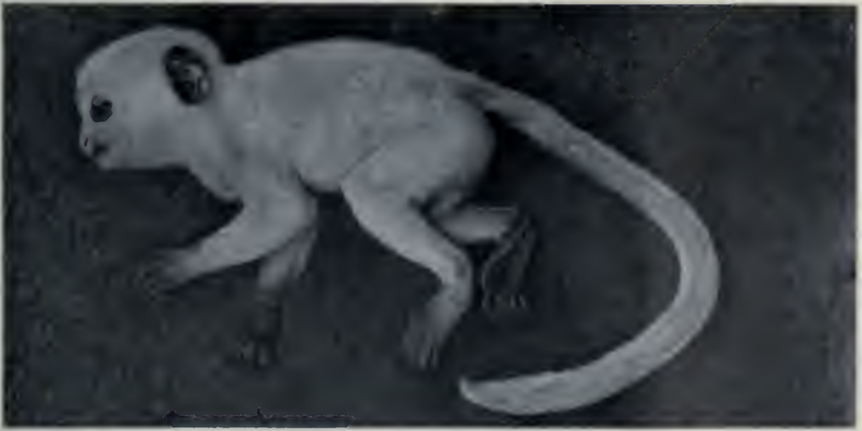

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PLATE CXII

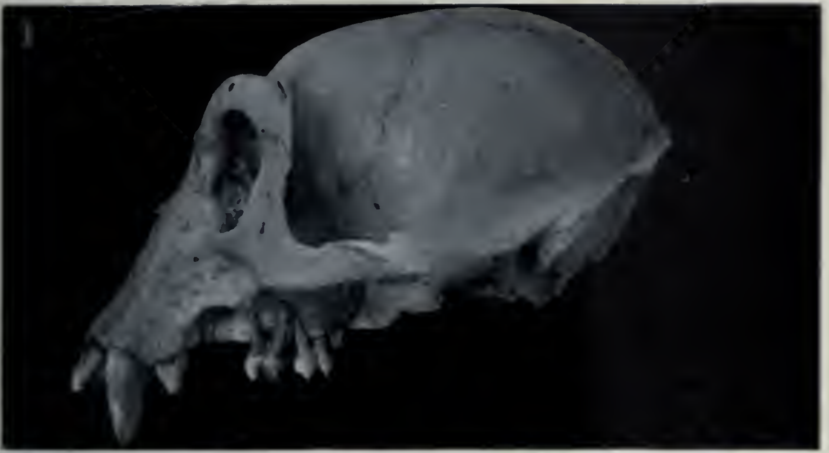
Colobus powelli powelli Matschie

Comparative left lateral views of three adult male skulls. Greatest length of skull, 112.3 mm. Compare with Pl. CXIII, showing three adult female skulls; also with different views to and including Pl. CXXI.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.

Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.

Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.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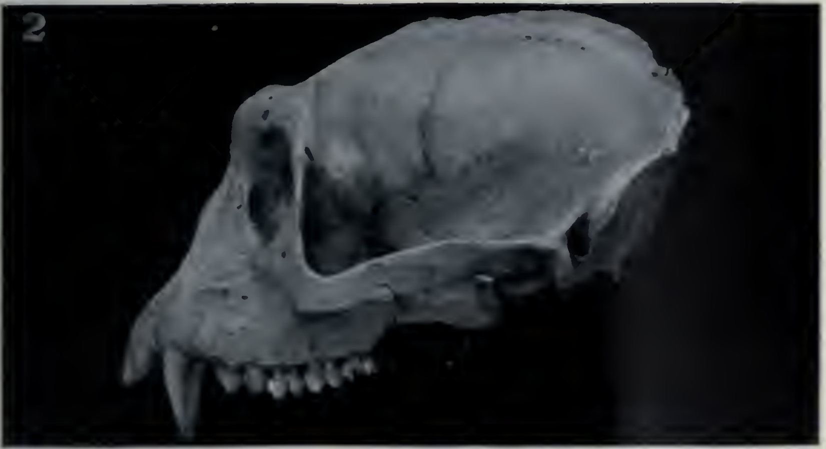
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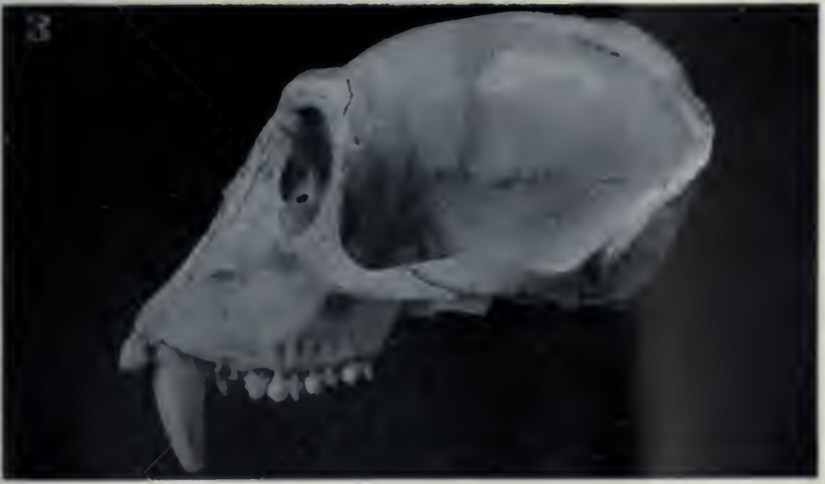
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PLATE CXIII

Colobus powelli powelli Matschie

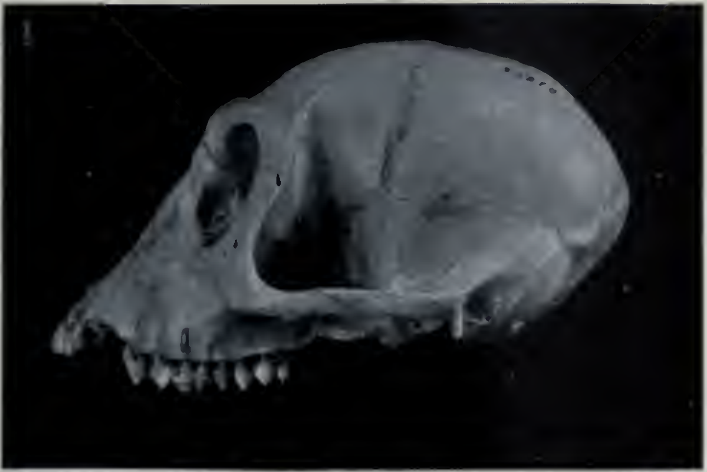
Comparative left lateral views of three adult female skulls. Greatest length of skull, 102.7 mm. Compare with Pl. CXII, showing three adult male skulls; also with different views to and including Pl. CXXI.

Fig. 1. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.

Fig. 2. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.

Fig. 3. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.

1



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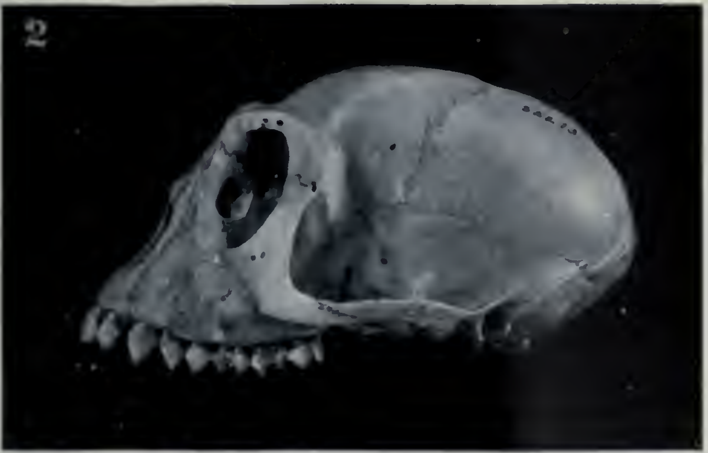

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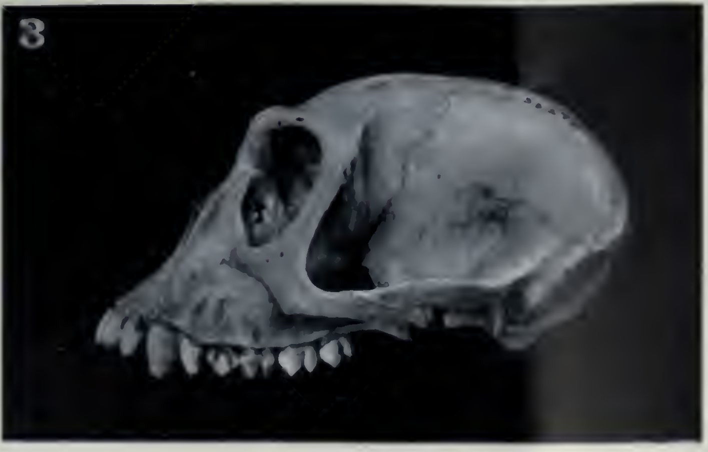

PLATE CXIV

Colobus powelli powelli Matschie

Comparative dorsal views of three adult male skulls. Greatest length of skull, 112.3 mm. Compare with Pl. CXV, showing three adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.
Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.

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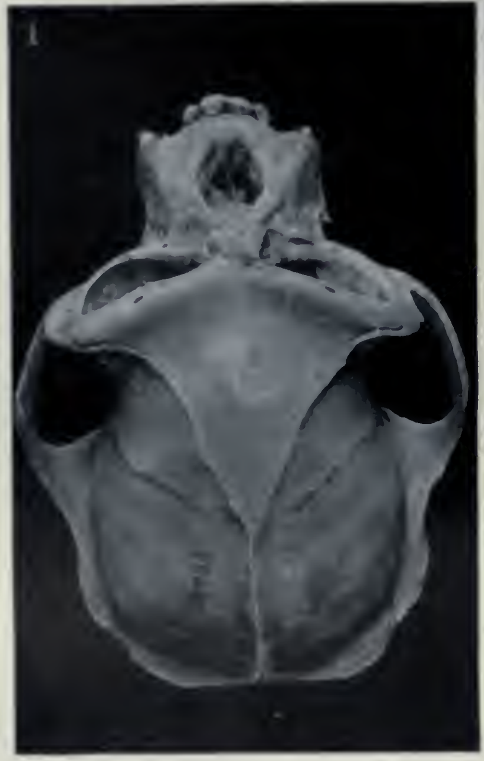

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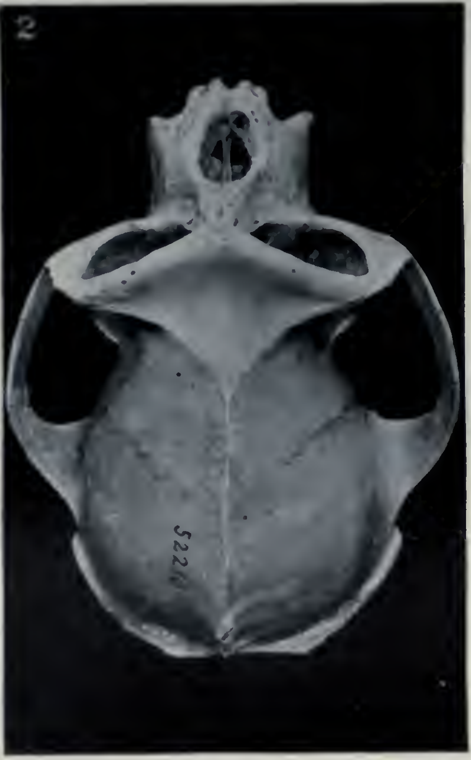

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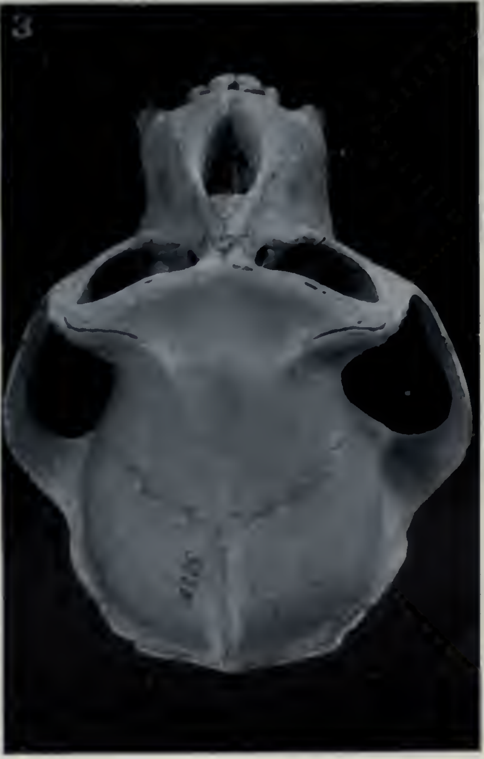
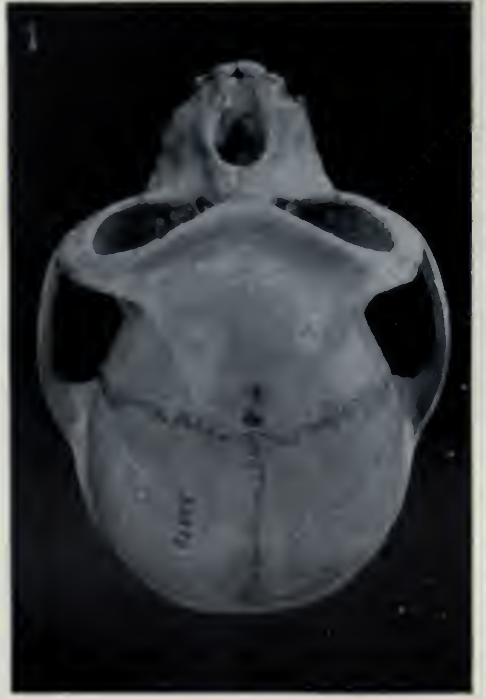


Plate CXV

Colobus powelli powelli Matschie

Comparative dorsal views of three adult female skulls. Greatest length of skull, 102.7 mm. Compare with Pl. CXIV, showing three adult male skulls.

Fig. 1. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
Fig. 2. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
Fig. 3. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.



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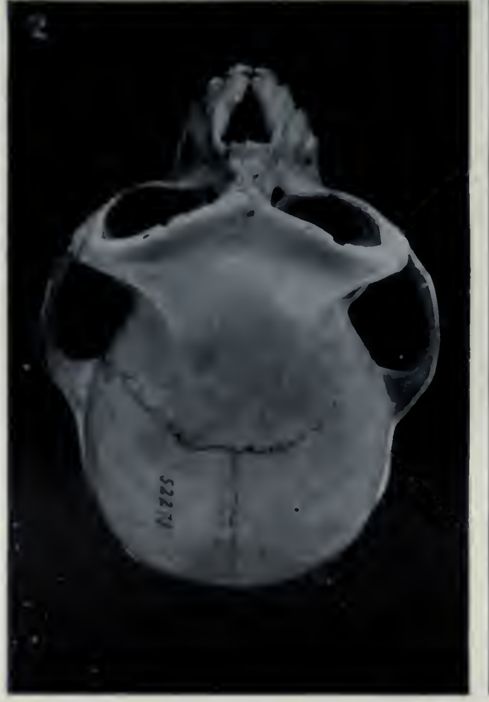

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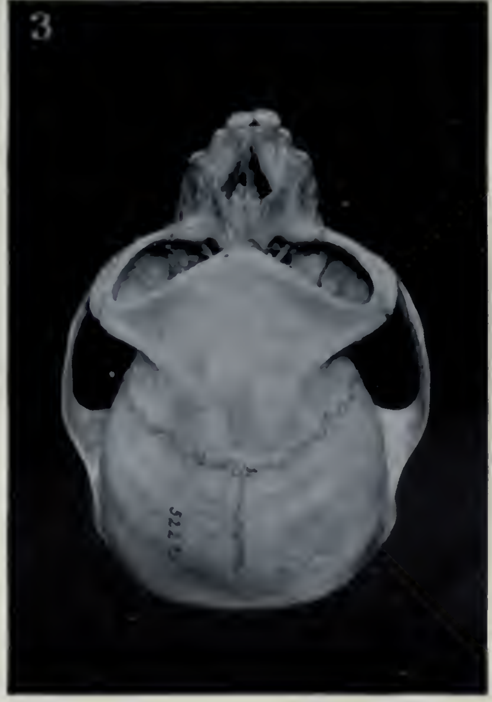

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PLATE CXVI

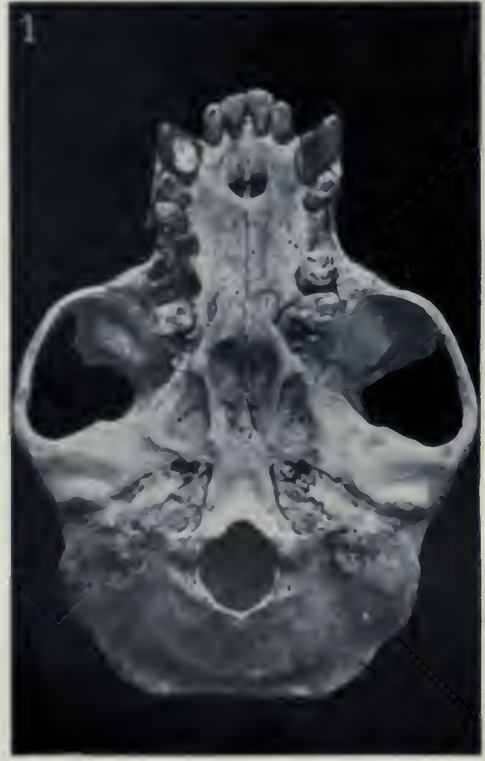
Colobus powelli powelli Matschie

Comparative palatal views of three adult male skulls. Greatest length of skull, 112.3 mm. Compare with Pl. CXVII, showing three adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.

Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.

Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.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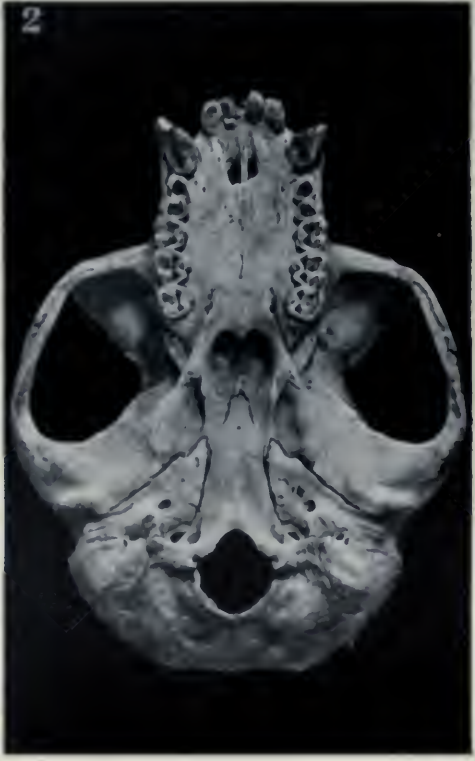
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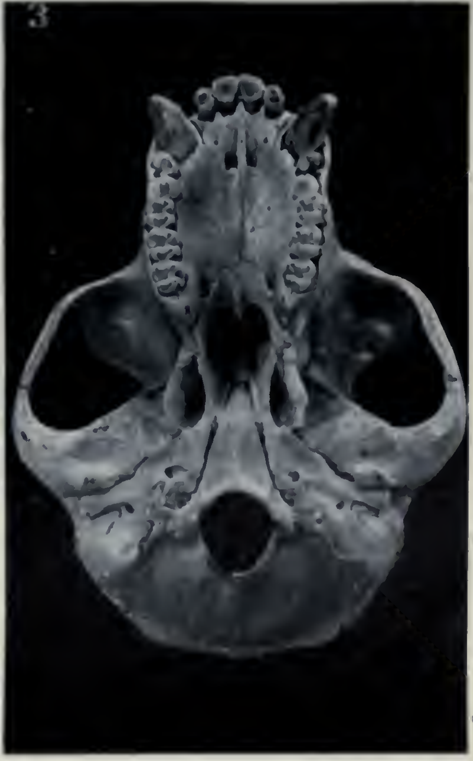
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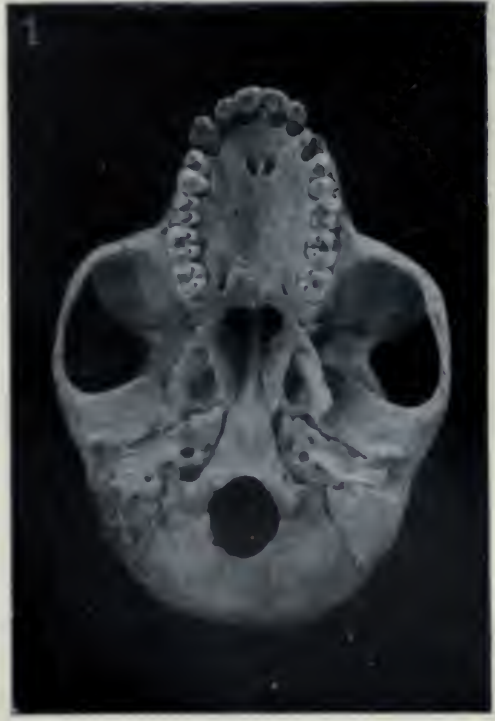
PLATE CXVII

Colobus powelli powelli Matschie

Comparative palatal views of three adult female skulls. Greatest length of skull, 102.7 mm. Compare with Pl. CXVI, showing three adult male skulls.

Fig. 1. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
Fig. 2. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
Fig. 3. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.



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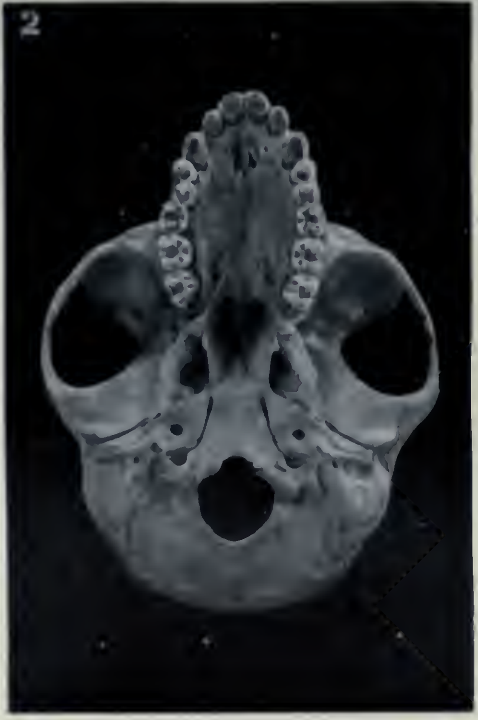

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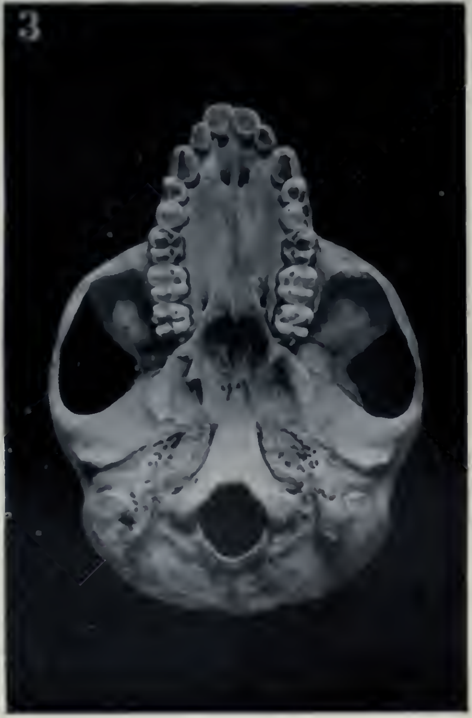

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PLATE CXVIII

Colobus powelli powelli Matschie

Comparative front views of six skulls. Greatest length of skull, 112.3 mm.

- Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.
- Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.
- Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.
- Fig. 4. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
- Fig. 5. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
- Fig. 6. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.

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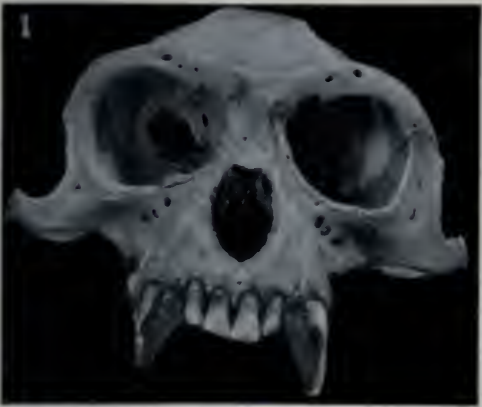

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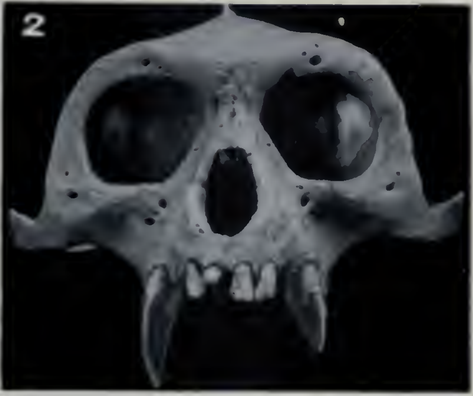

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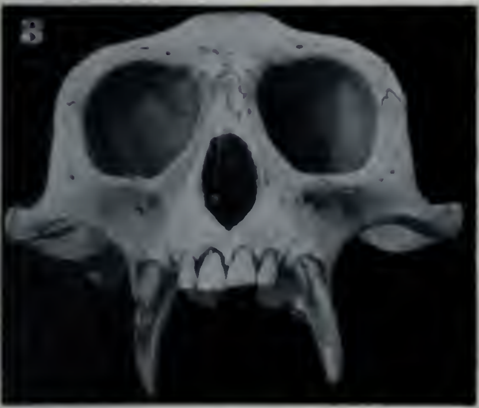

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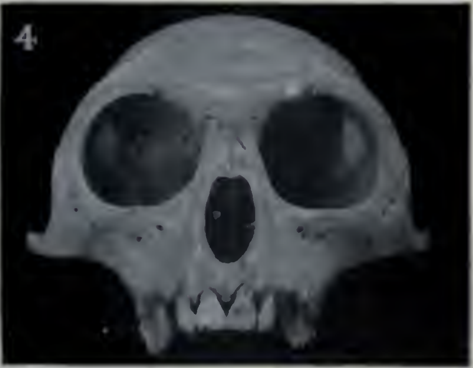

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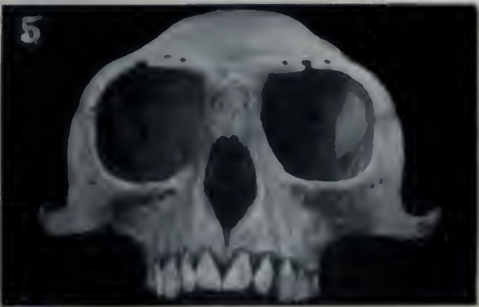

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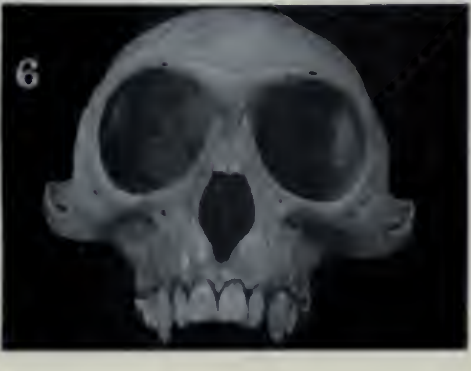
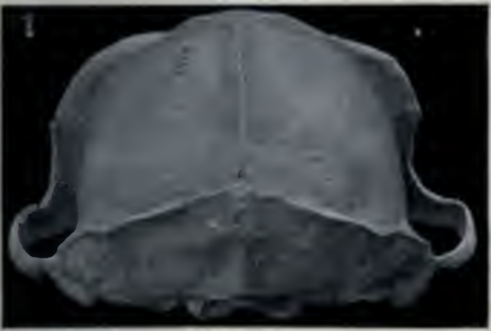


PLATE CXIX

Colobus powelli powelli Matschie

Comparative occipital views of six skulls. Greatest length of skull, 112.3 mm.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.
Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.
Fig. 4. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.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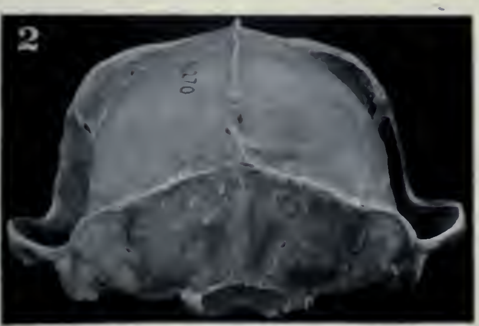
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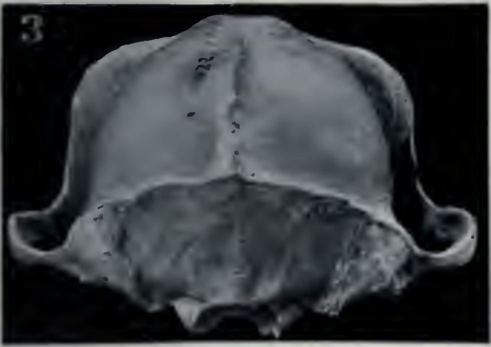
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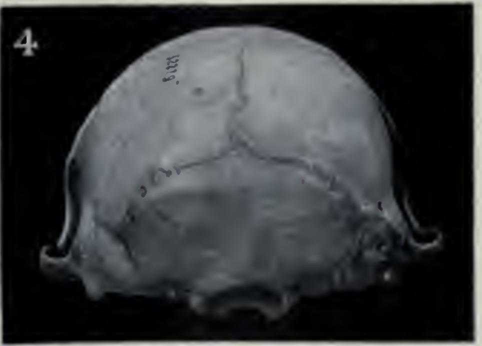
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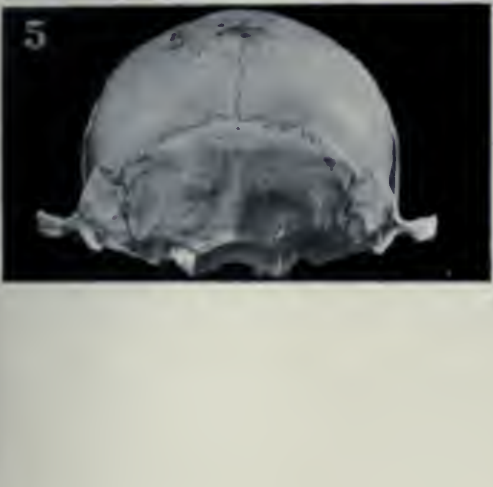
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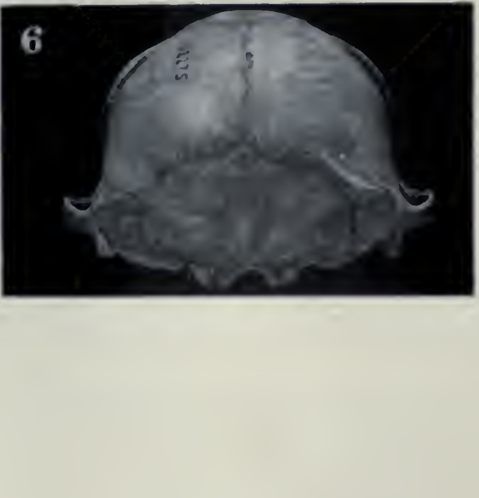
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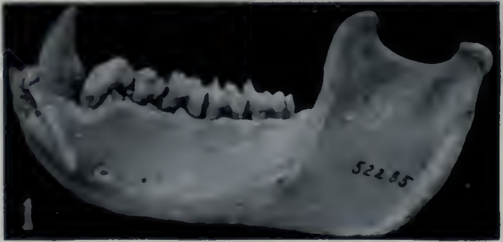
PLATE CXX

Colobus powelli powelli Matschie

Comparative left lateral views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.
Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.
Fig. 4. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.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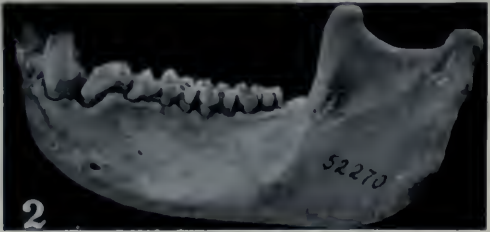
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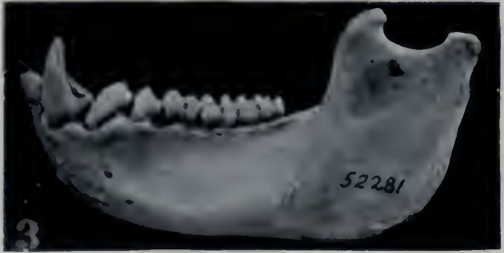
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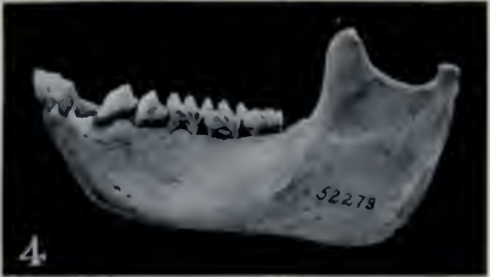
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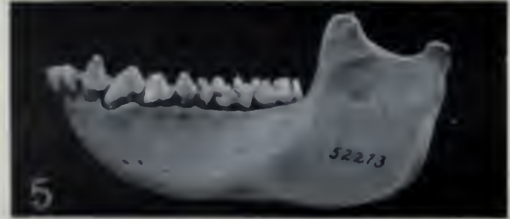
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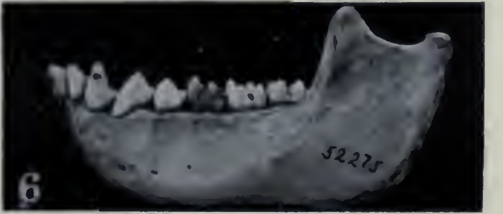
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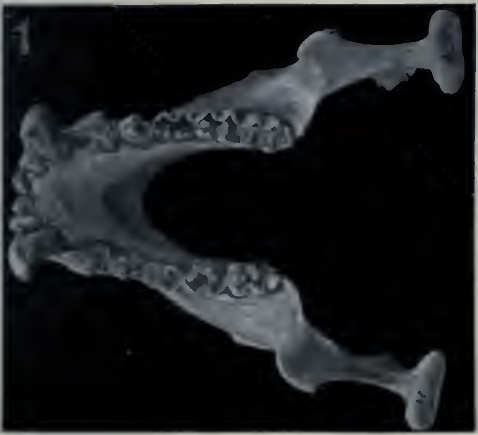
Plate CXXI

Colobus powelli powelli Matschie

Comparative crown views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52265, Akenge, October 1, 1913.
Fig. 2. Male adult, Amer. Mus. No. 52270, Akenge, October 5, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52281, Akenge, October 21, 1913.
Fig. 4. Female adult, Amer. Mus. No. 52279, Akenge, October 20, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52273, Akenge, October 10, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52275, Akenge, October 13, 1913.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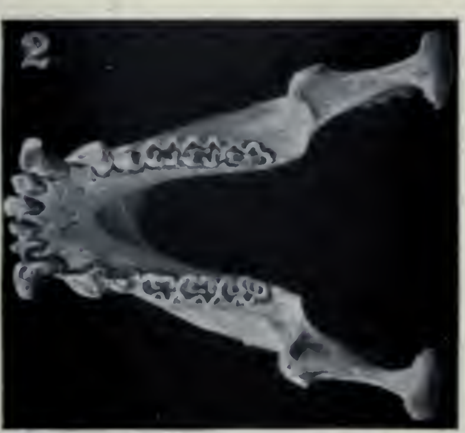
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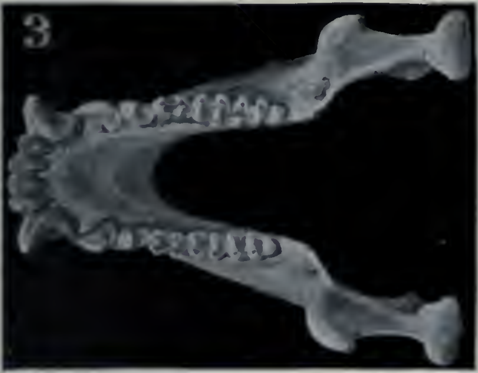
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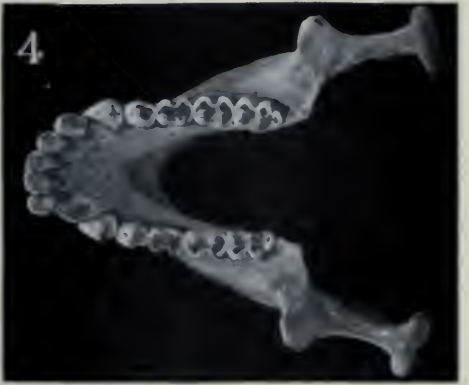
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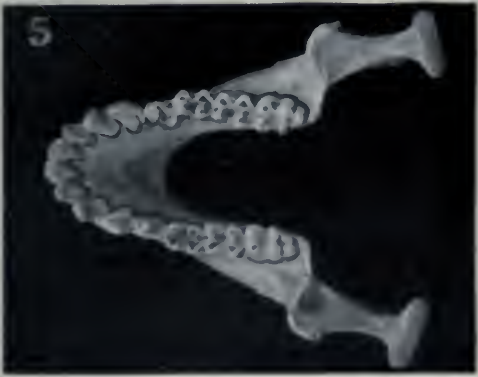
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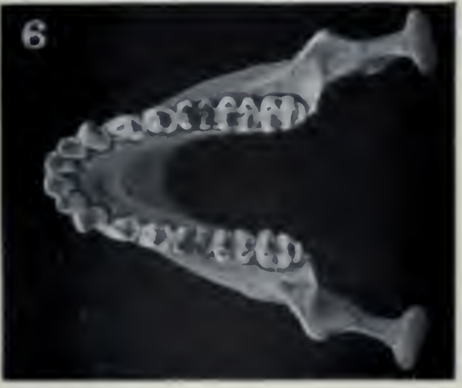
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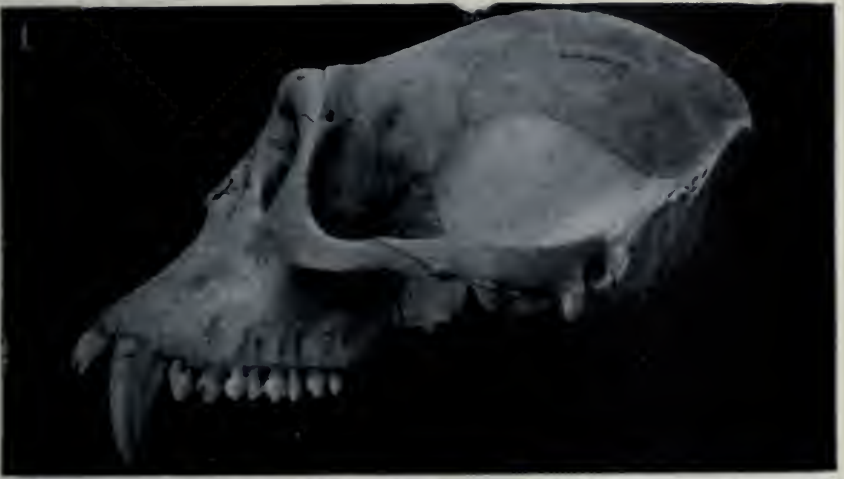
PLATE CXXII

Colobus powelli brunneus Lönnberg

Comparative left lateral views of three adult male skulls. Greatest length of skull, 130.7 mm. Compare with Pl. CXXIII, showing another adult male and two adult female skulls; also with different views to and including Pl. CXXXI.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3, 1911.



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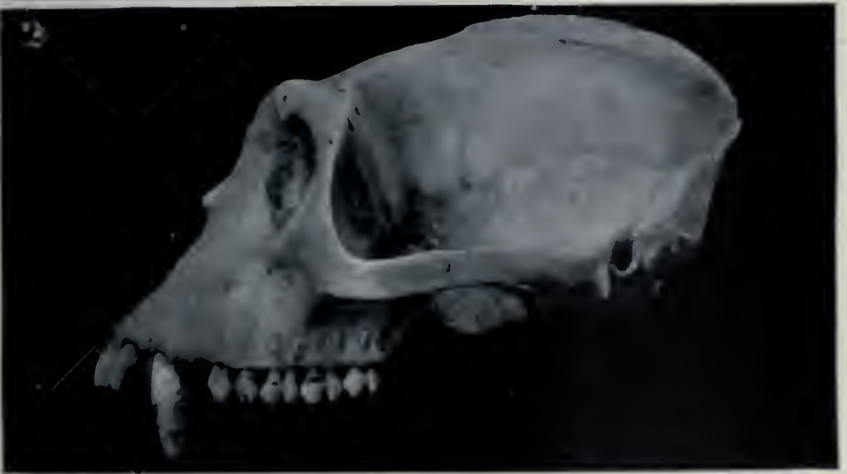

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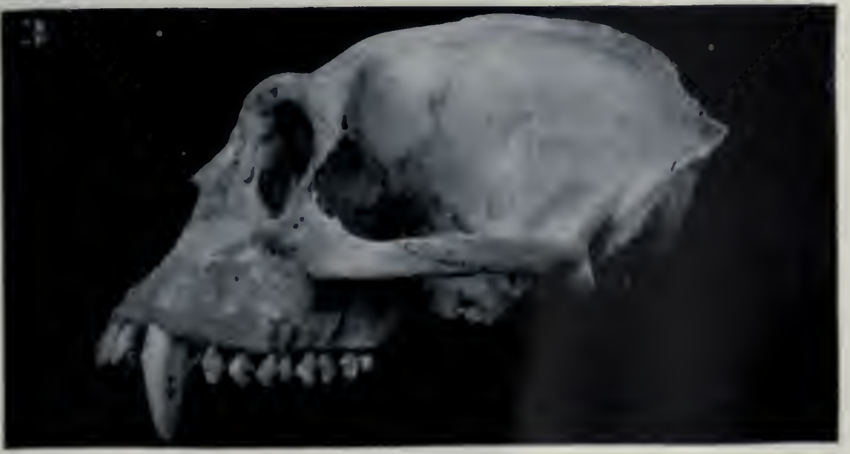

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PLATE CXXIII

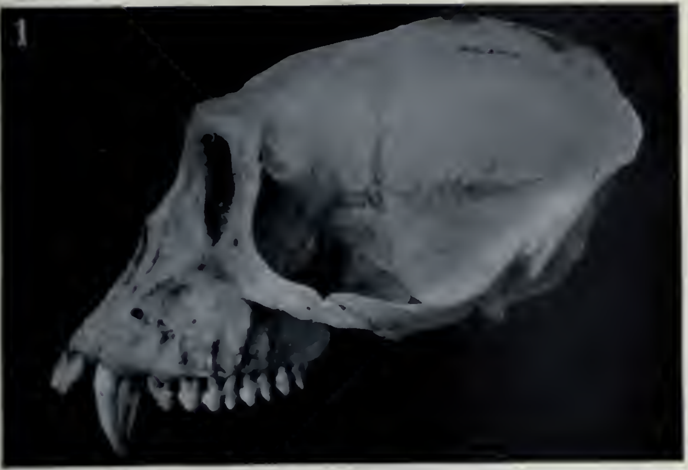
Colobus powelli brunneus Lönnberg

Comparative left lateral views of one adult male and two adult female skulls. Greatest length of skull, 117.8 mm. Compare with Pl. CXXII, showing three adult male skulls; also with different views to and including Pl. CXXXI.

Fig. 1. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.

Fig. 2. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.

Fig. 3. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.



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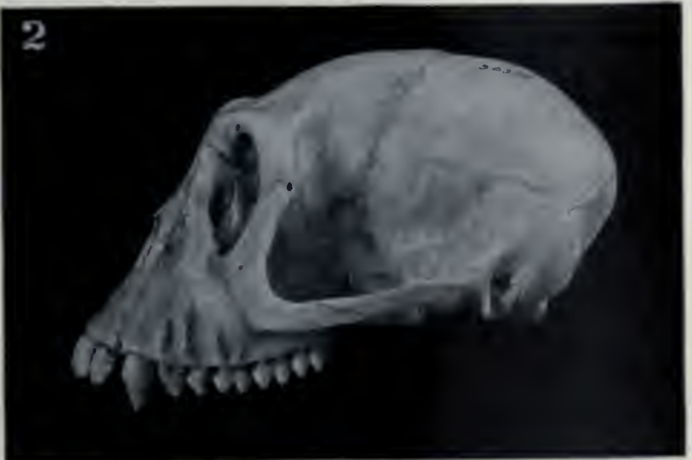

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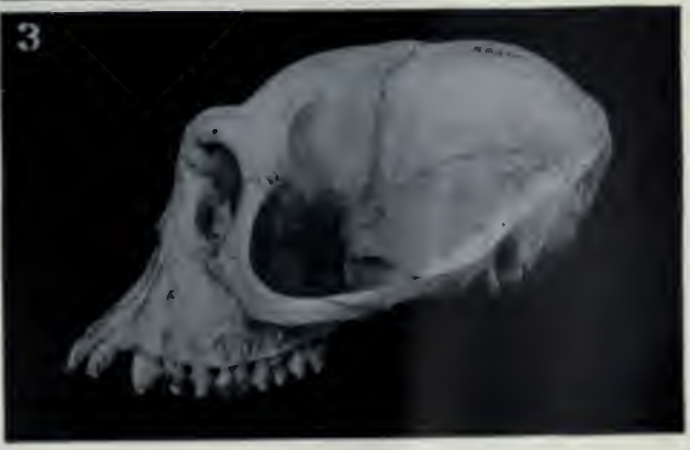

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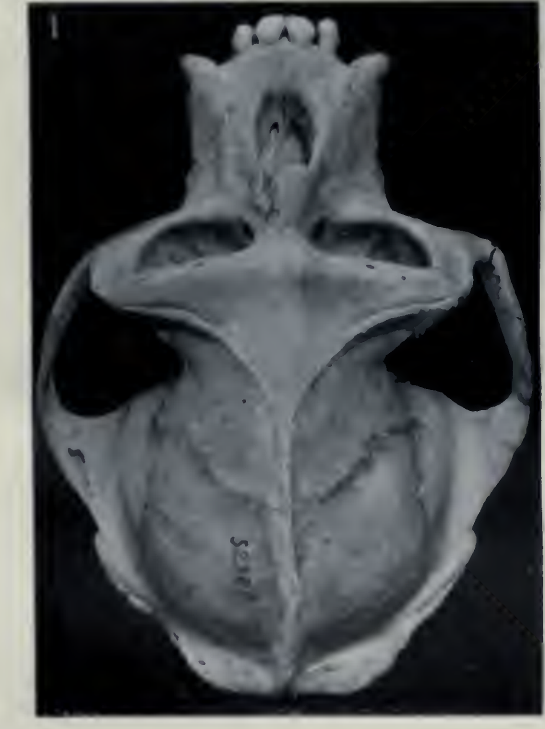
Plate CXXIV

Colobus powelli brunneus Lönnberg

Comparative dorsal views of three adult male skulls. Greatest length of skull, 130.7 mm. Compare with Pl. CXXV, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3, 1911.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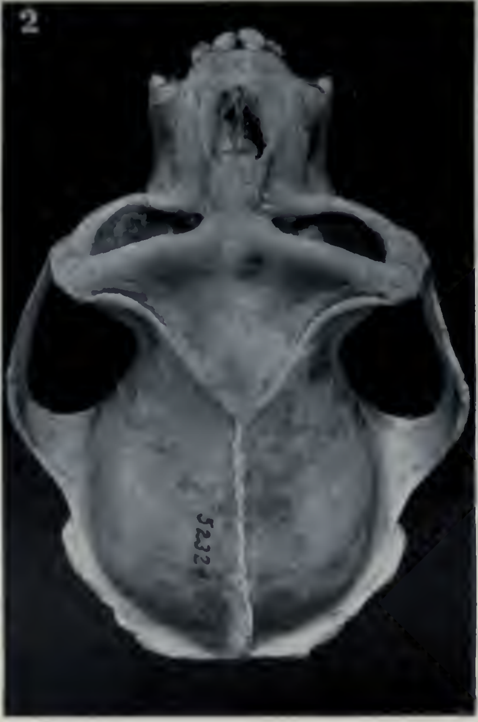
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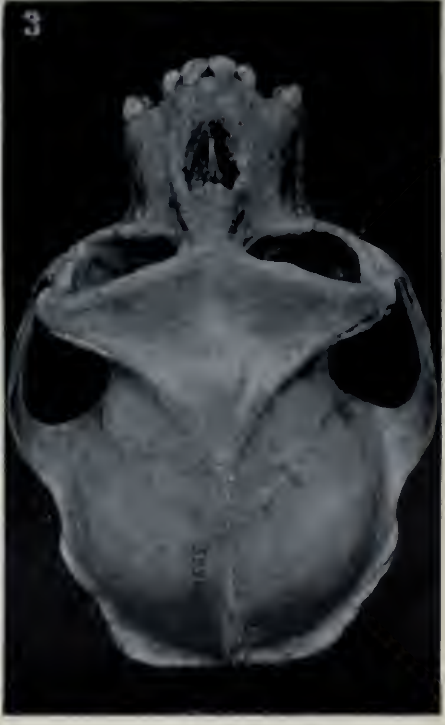
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PLATE CXXV

Colobus powelli brunneus Lönnberg

Comparative dorsal views of one adult male and two adult female skulls. Greatest length of skull, 117.8 mm. Compare with Pl. CXXIV, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 2. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 3. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.

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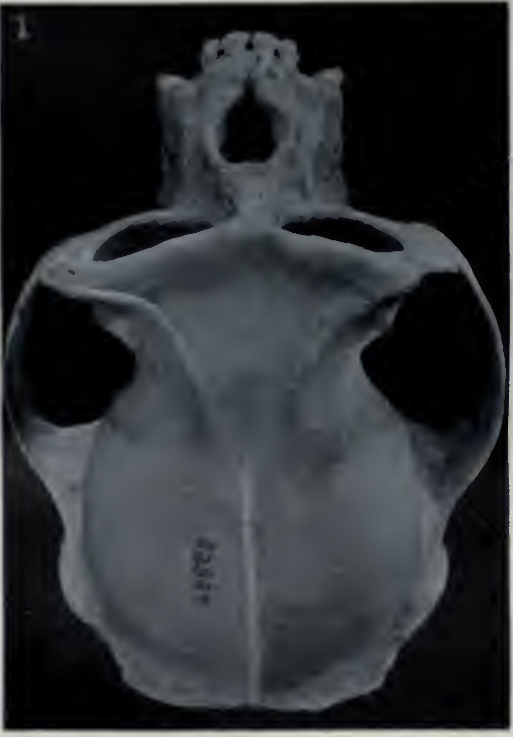

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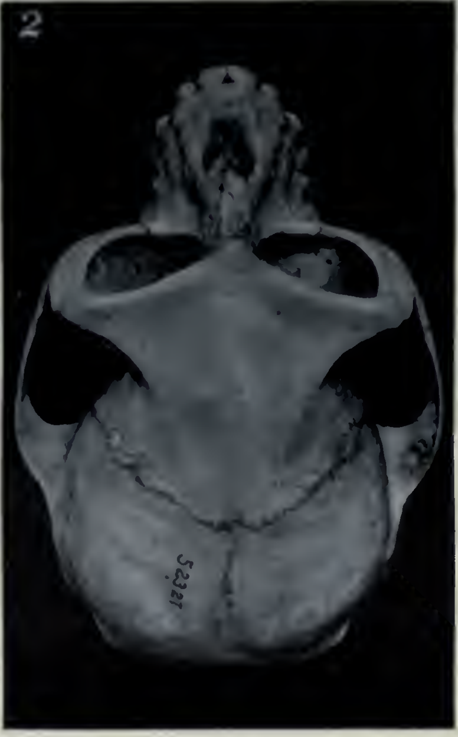

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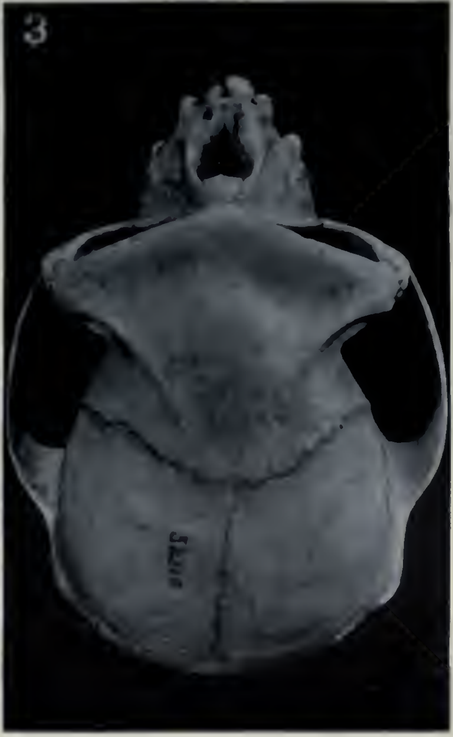

Plate CXXVI

Colobus powelli brunneus Lönnberg

Comparative palatal views of three adult male skulls. Greatest length of skull, 130.7 mm. Compare with Pl. CXXVII, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3. 1911.

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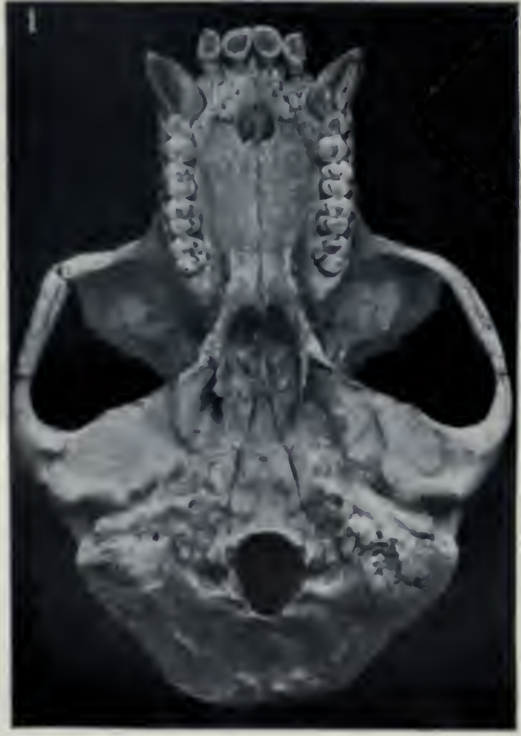

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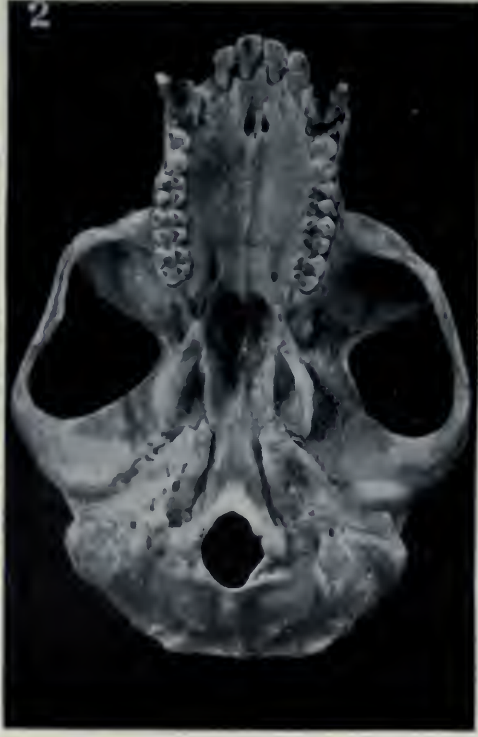

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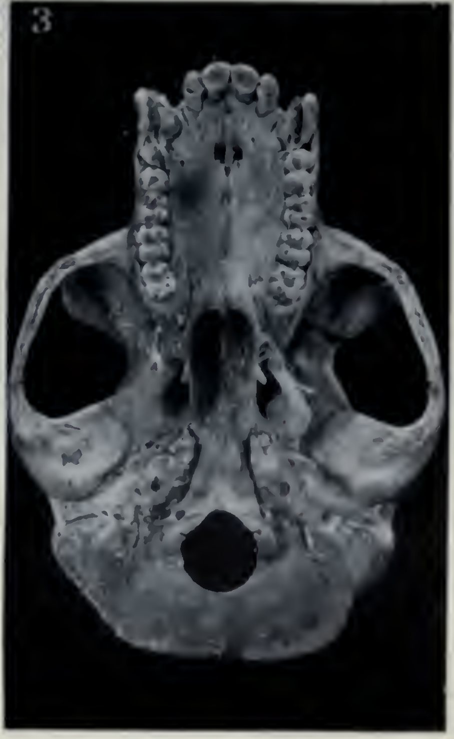
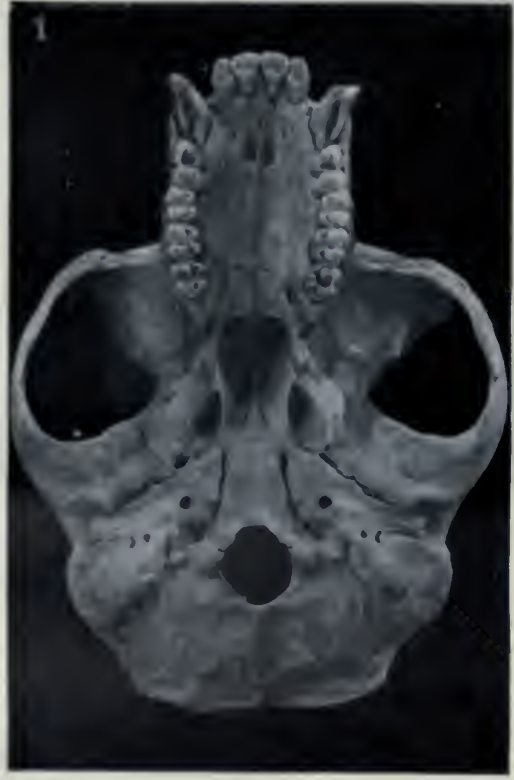


Plate CXXVII

Colobus powelli brunneus Lönnberg

Comparative palatal views of one adult male and two adult female skulls. Greatest length of skull, 117.8 mm. Compare with Pl. CXXVI, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 2. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 3. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.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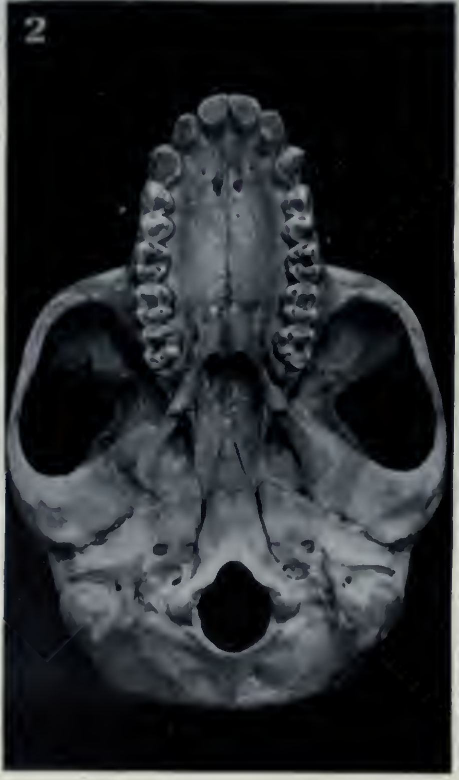
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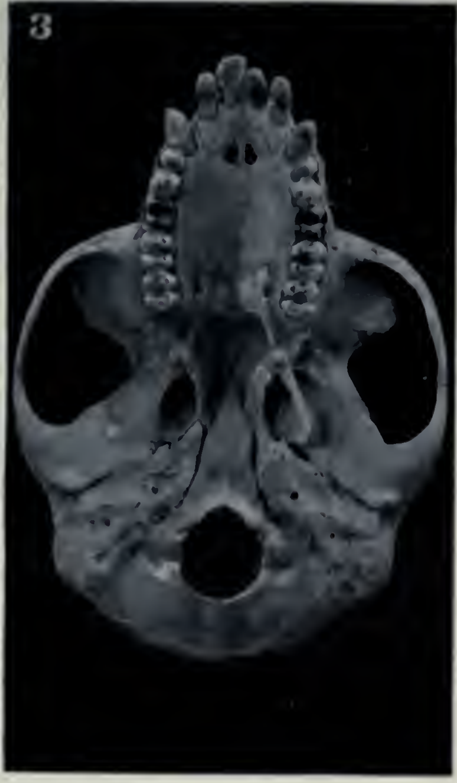
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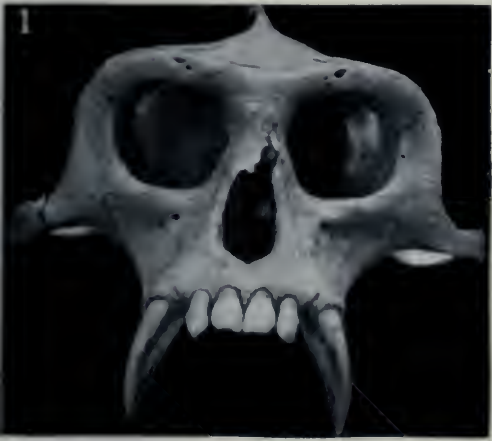
Plate CXXVIII

Colobus powelli brunneus Lönnberg

Comparative front views of six skulls. Greatest length of skull, 130.7 mm.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324. Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329. Faradje, December 3, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 5. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.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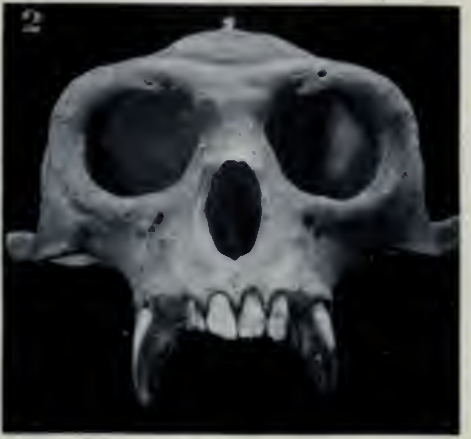
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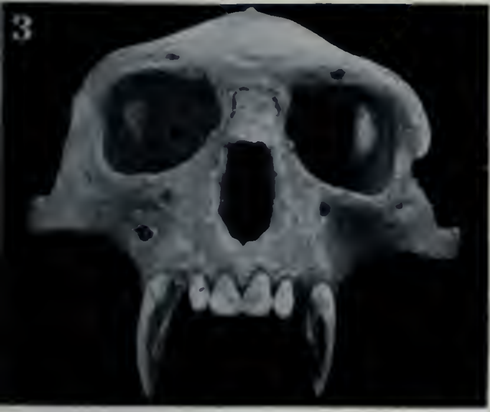
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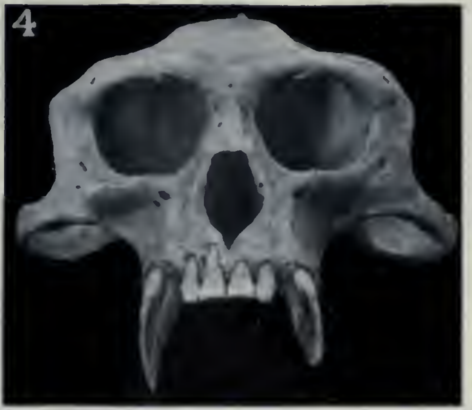
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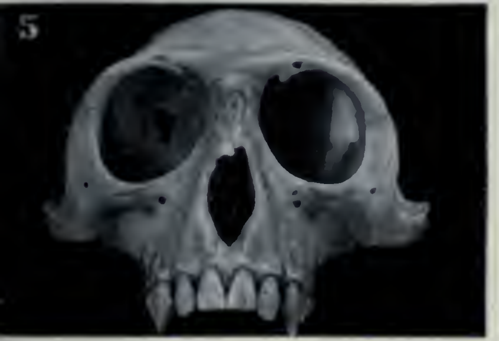
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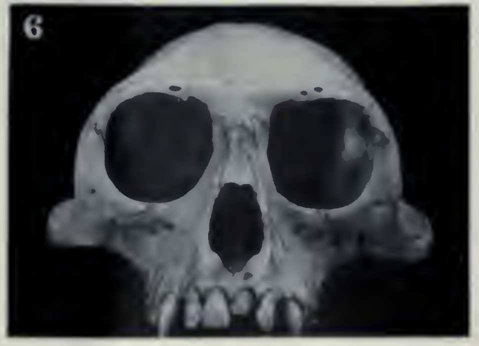
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PLATE CXXIX

Colobus powelli brunneus Lönnberg

Comparative occipital views of six skulls. Greatest length of skull, 130.7 mm.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 5. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.

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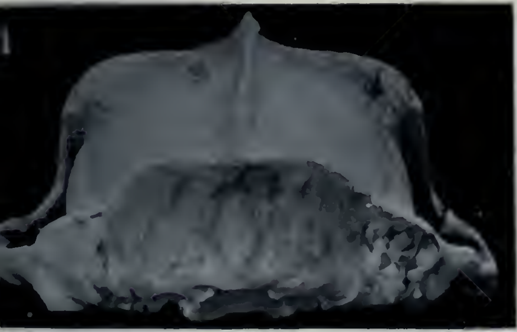

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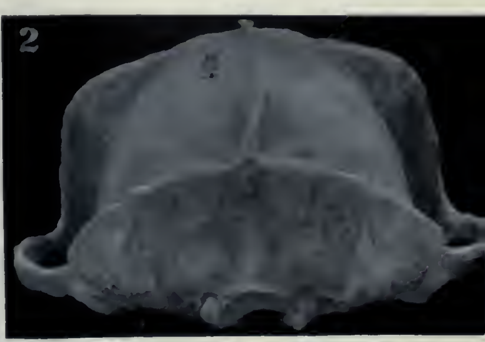

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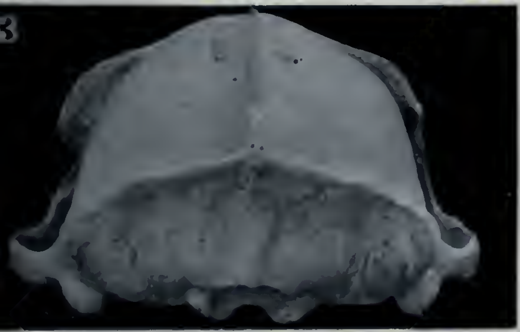

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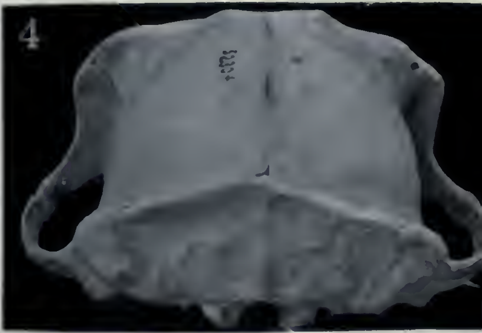

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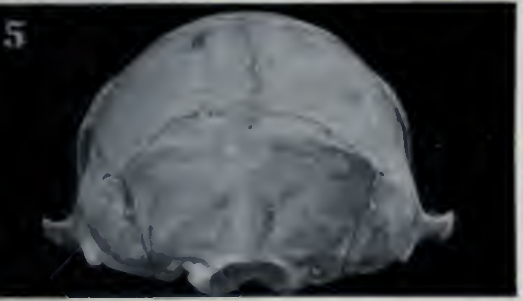

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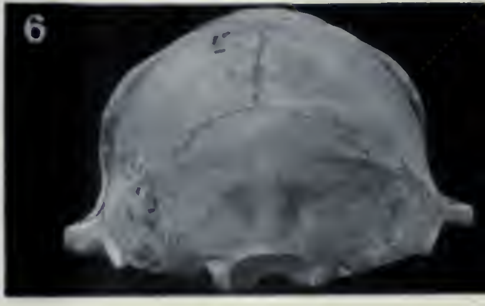

PLATE CXXX

Colobus powelli brunneus Lönnberg

Comparative left lateral views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 5. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.

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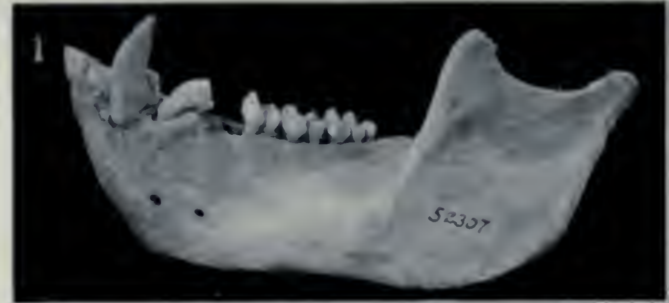

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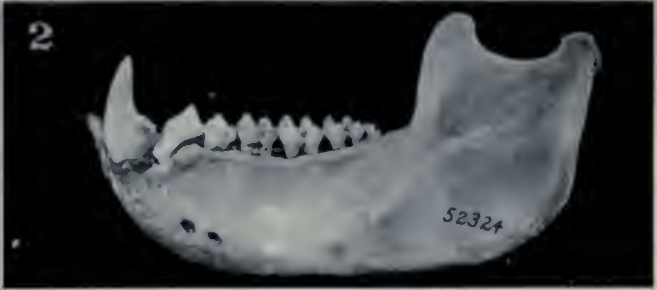

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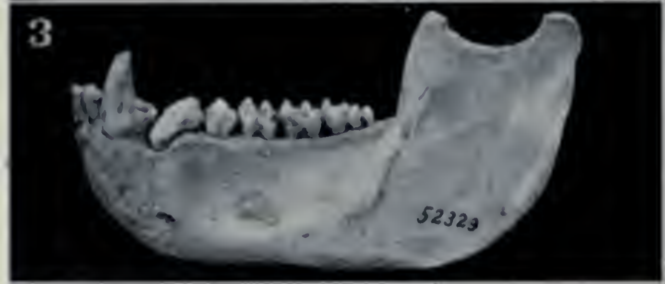

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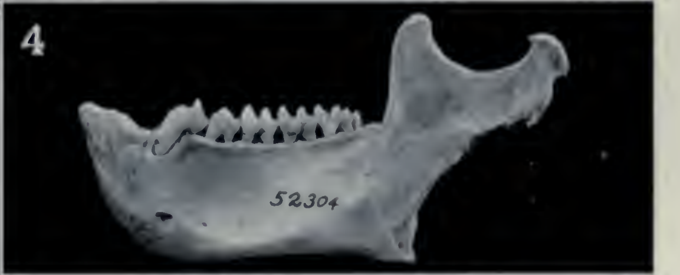

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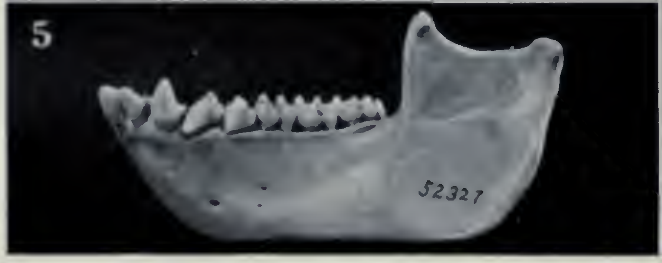

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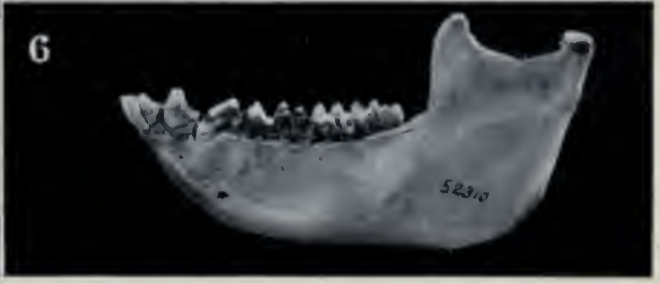

PLATE CXXXI

Colobus powelli brunneus Lönnberg

Comparative crown views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52307, Faradje, November 23, 1911.
Fig. 2. Male adult, Amer. Mus. No. 52324, Faradje, December 2, 1911.
Fig. 3. Male adult, Amer. Mus. No. 52329, Faradje, December 3, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52304, Faradje, November 23, 1911.
Fig. 5. Female adult, Amer. Mus. No. 52327, Faradje, December 2, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52310, Faradje, November 23, 1911.

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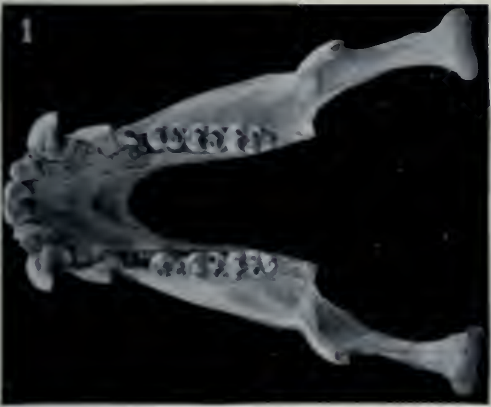

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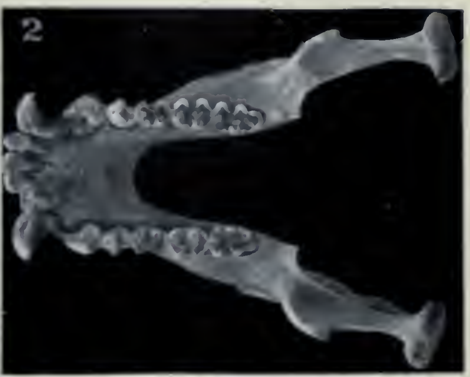

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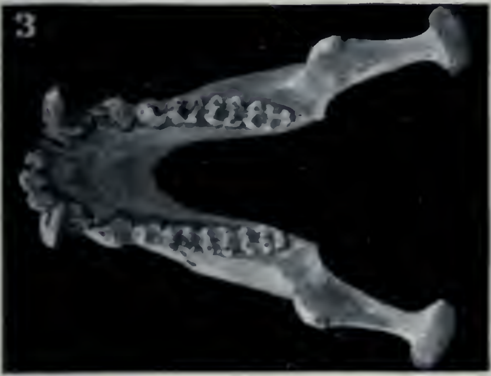

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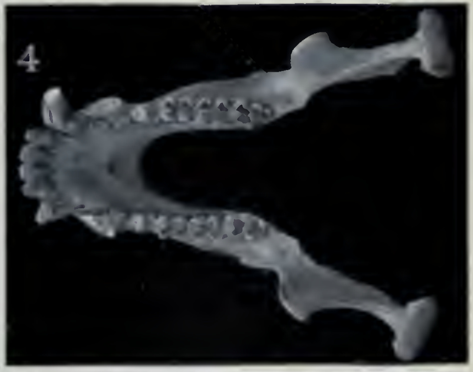

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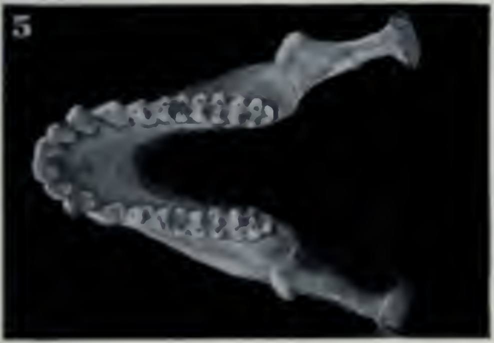

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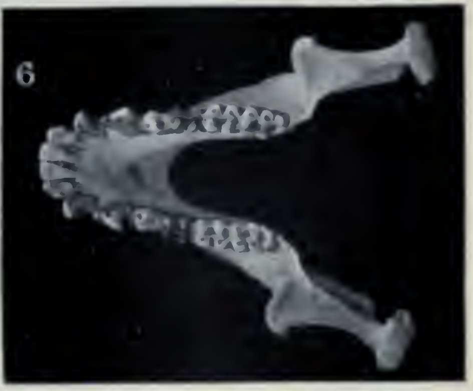

Plate CXXXII

Colobus abyssinicus ituricus Matschie

Comparative left lateral views of three adult male skulls. Greatest length of skull, 119.8 mm. Compare with Pl. CXXXIII, showing another adult male and two adult female skulls; also with different views to and including Pl. CXLI.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.
Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.

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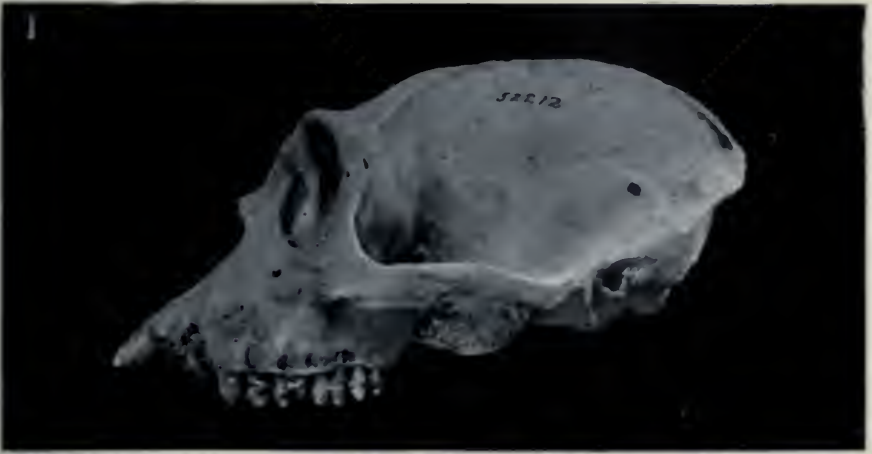

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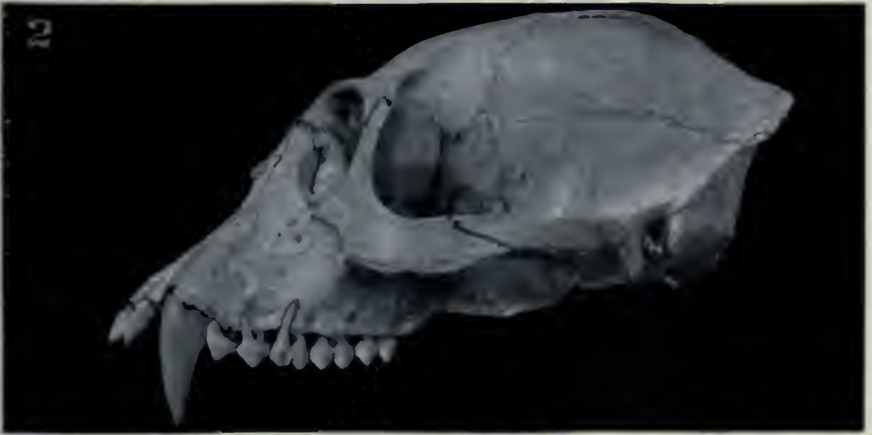

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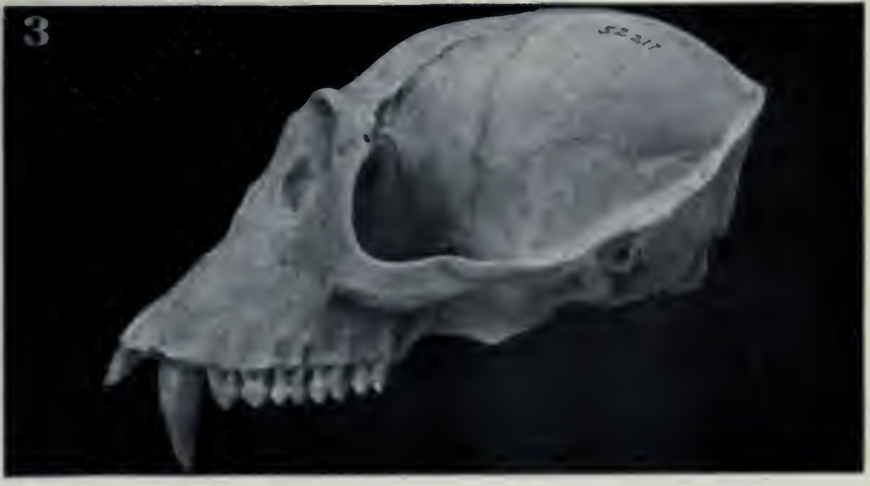
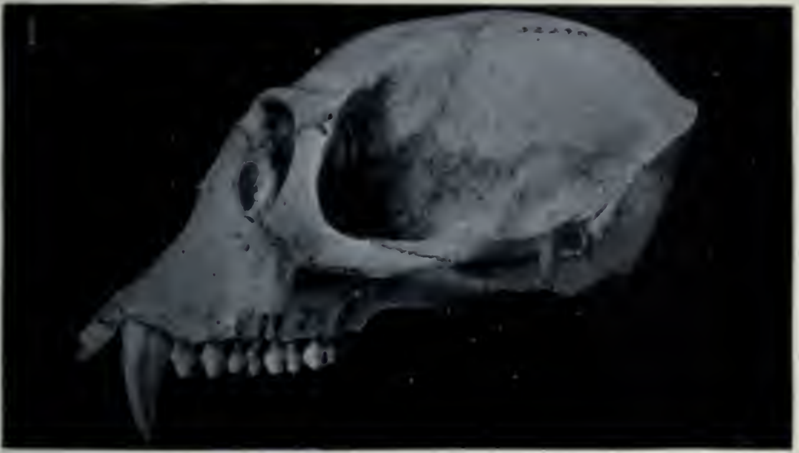


PLATE CXXXIII

Colobus abyssinicus ituricus Matschie

Comparative left lateral views of one adult male and two adult female skulls. Greatest length of skull, 114.6 mm. Compare with Pl. CXXXII, showing three adult male skulls; also with different views to and including Pl. CXLI.

Fig. 1. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 2. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 3. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1911.



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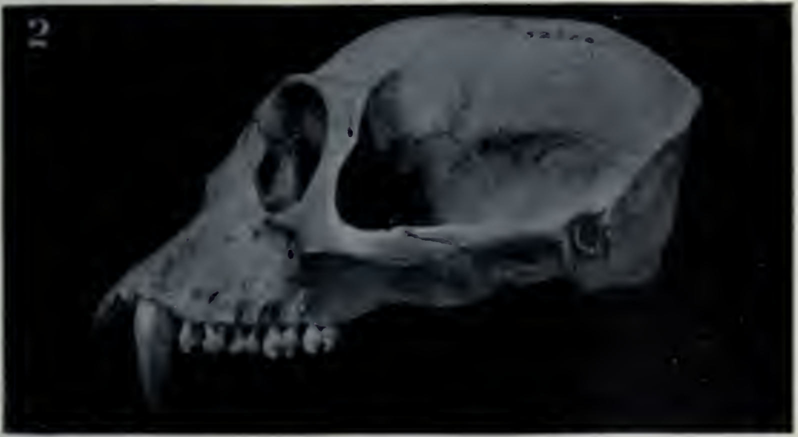

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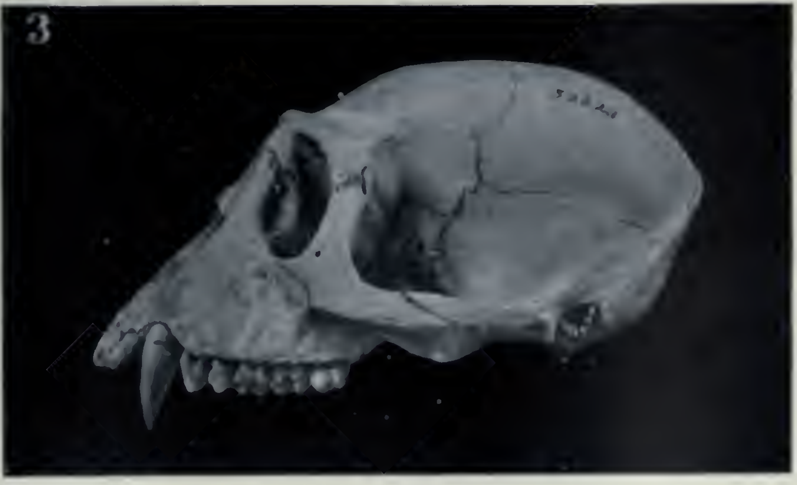

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Plate CXXXIV

Colobus abyssinicus ituricus Matschie

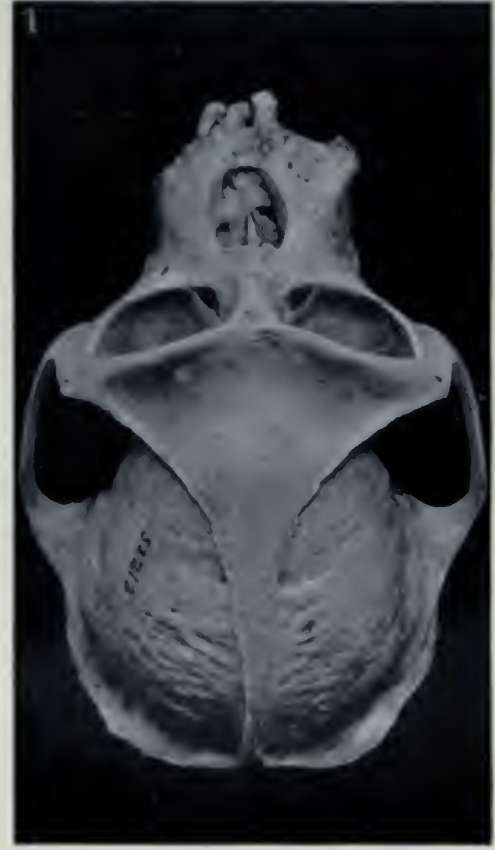
Comparative dorsal views of three adult male skulls. Greatest length of skull, 119.8 mm. Compare with Pl. CXXXV, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.

Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.

Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.

1



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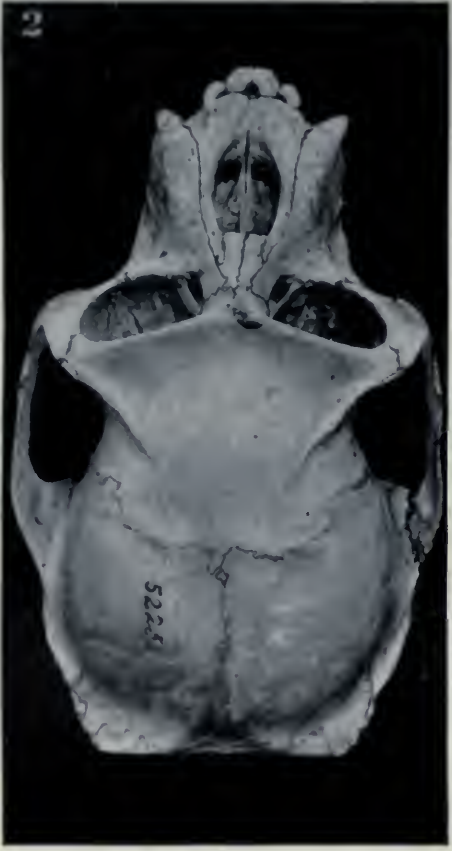

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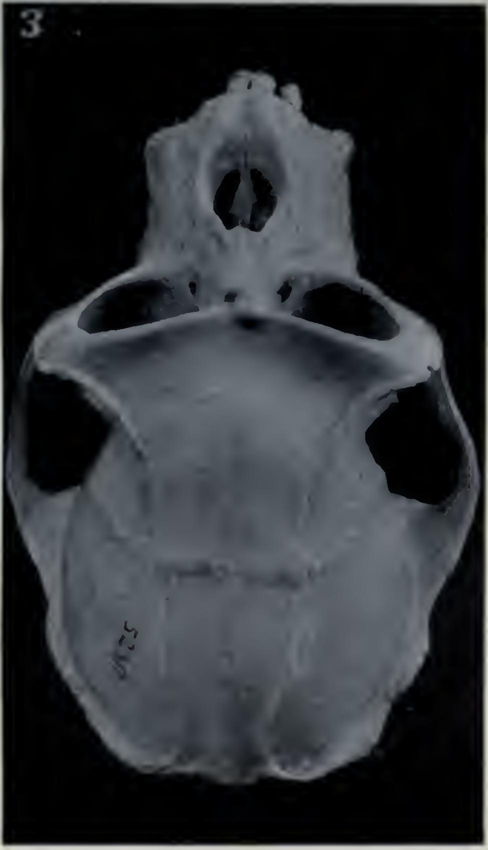
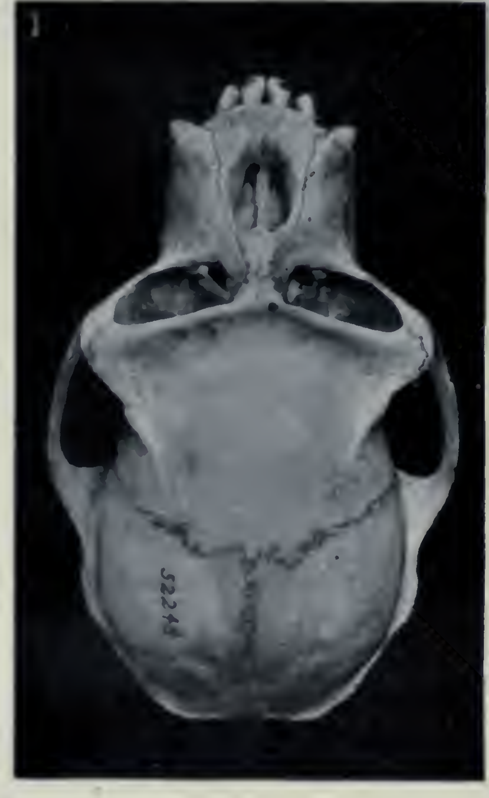


PLATE CXXXV

Colobus abyssinicus ituricus Matschie

Comparative dorsal views of one adult male and two adult female skulls. Greatest length of skull, 114.6 mm. Compare with Pl. CXXXIV, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 2. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 3. Female adult, Amer Mus. No. 52223, Faradje, February 15, 1911.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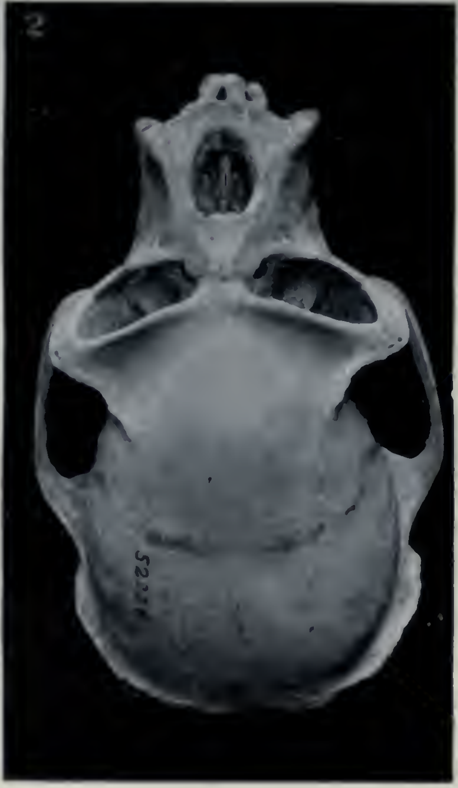
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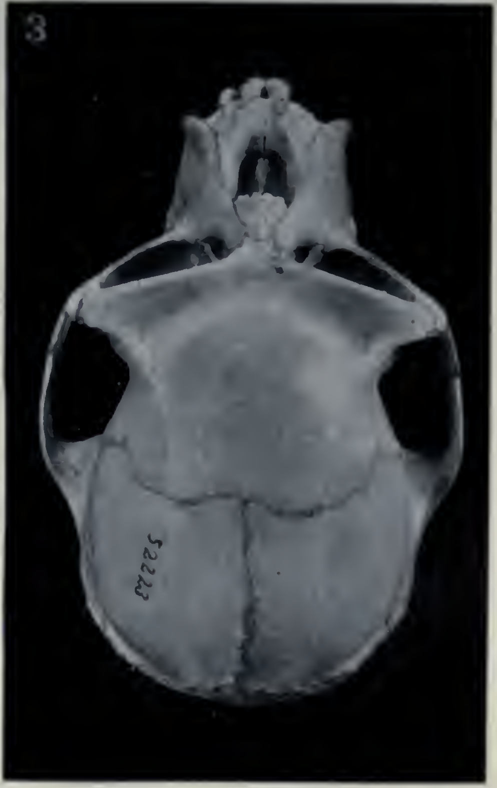

3
52223

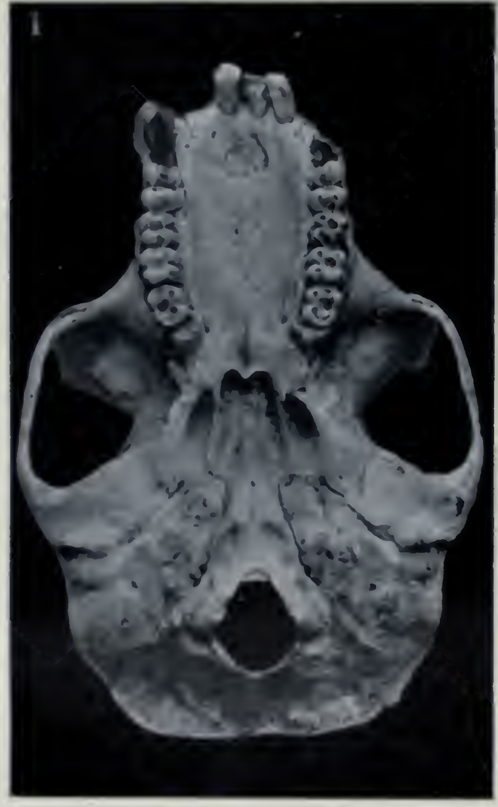
PLATE CXXXVI

Colobus abyssinicus ituricus Matschie

Comparative palatal views of three adult male skulls. Greatest length of skull, 119.8 mm. Compare with Pl. CXXXVII, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.
Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.

1



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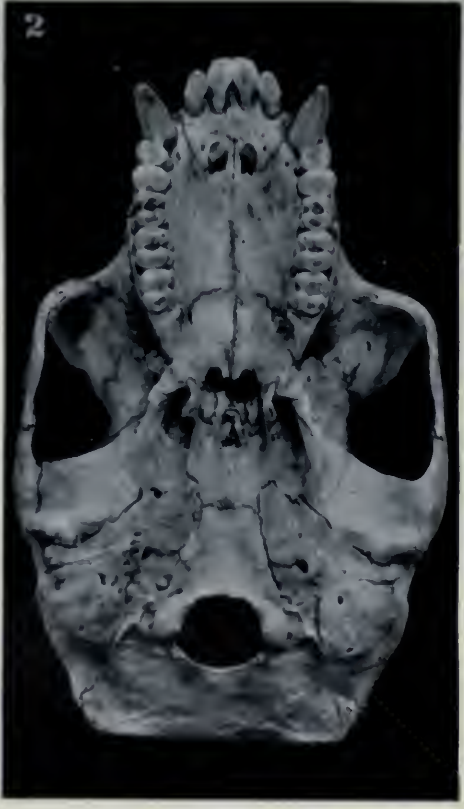

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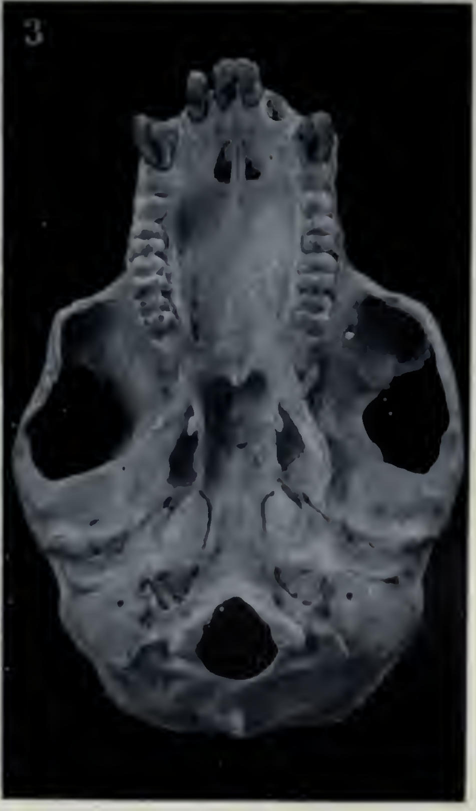
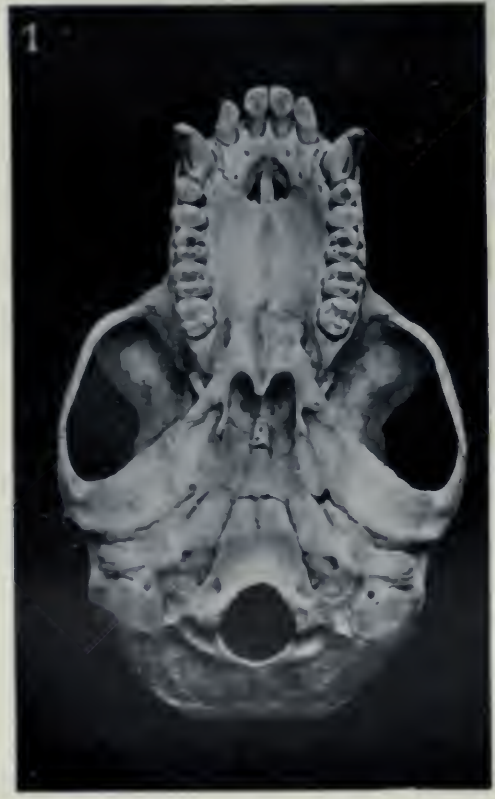


PLATE CXXXVII

Colobus abyssinicus ituricus Matschie

Comparative palatal views of one adult male and two adult female skulls. Greatest length of skull, 114.6 mm. Compare with Pl. CXXXVI, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 2. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 3. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1911.



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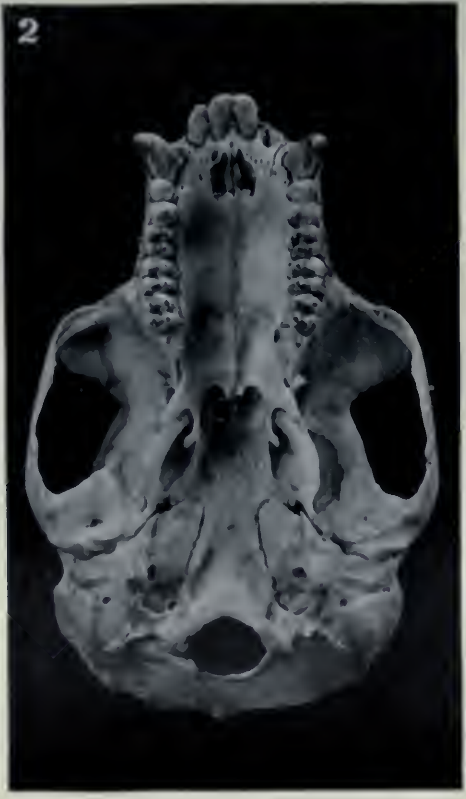

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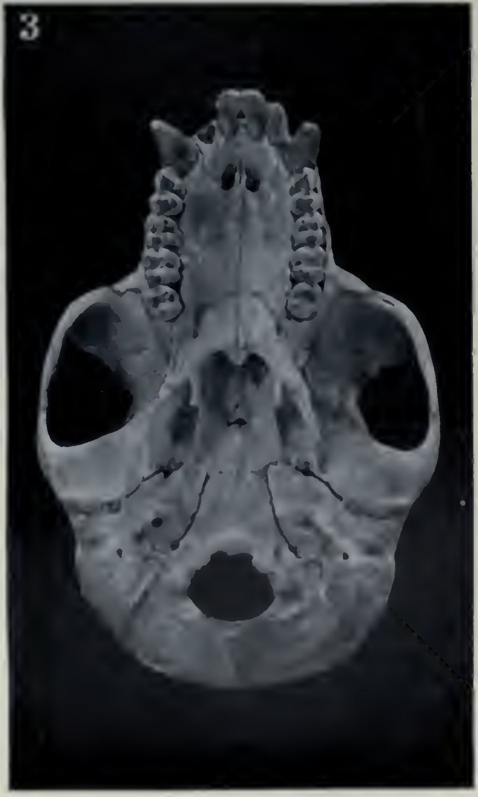

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Plate CXXXVIII

Colobus abyssinicus ituricus Matschie

Comparative front views of six skulls. Greatest length of skull, 119.8 mm.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.

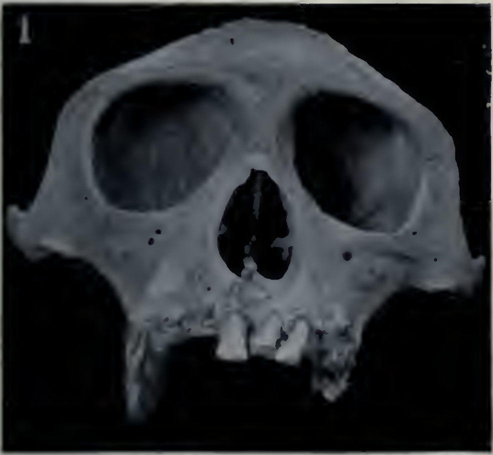
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.

Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.

Fig. 4. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.

Fig. 5. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.

Fig. 6. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1913.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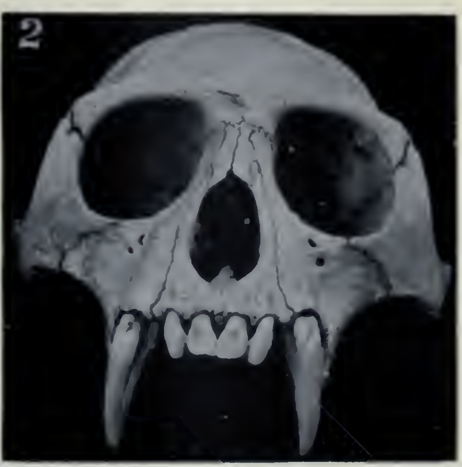
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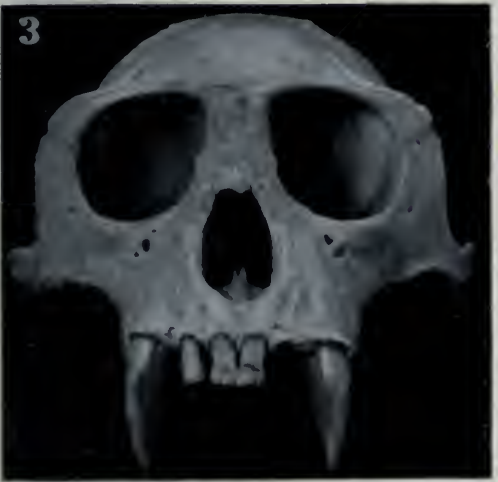
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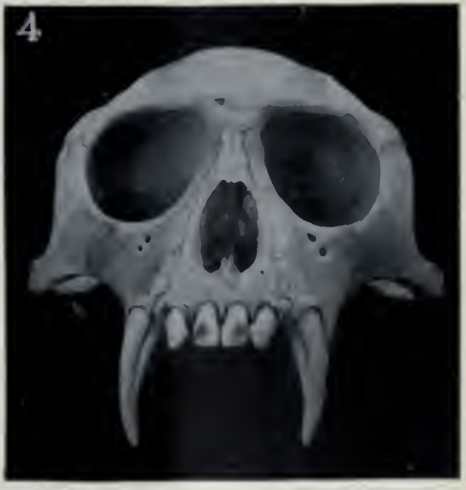
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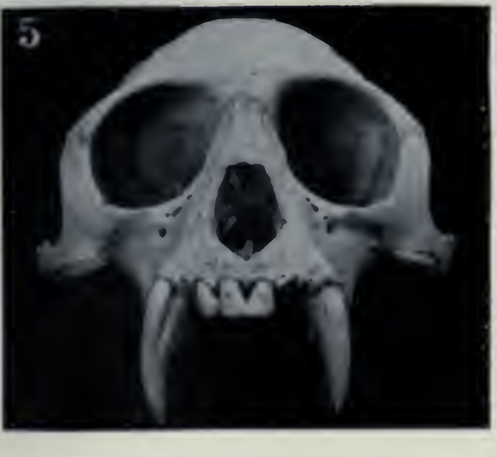
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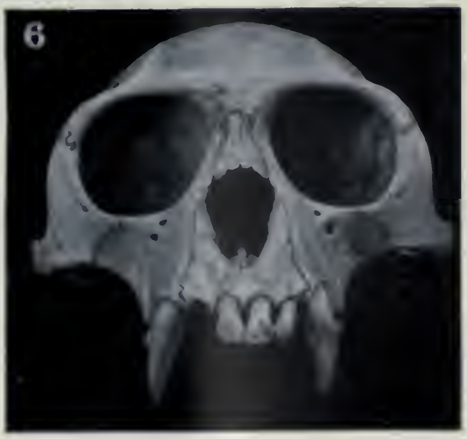
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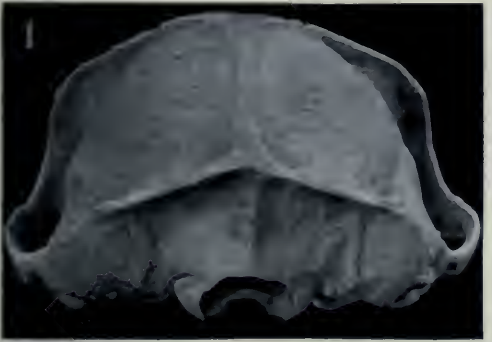
PLATE CXXXIX

Colobus abyssinicus ituricus Matschie

Comparative occipital views of six skulls. Greatest length of skull, 119.8 mm.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.
Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 5. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1913.

1



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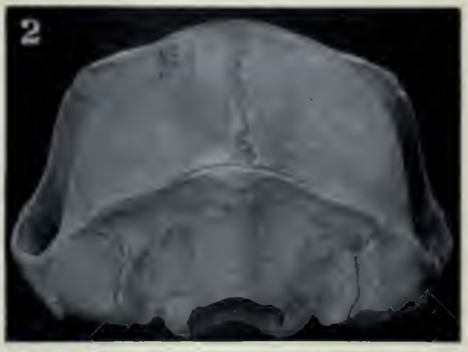

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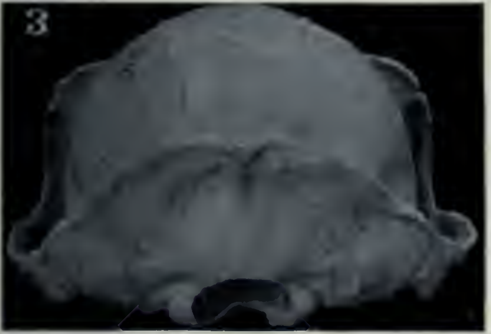

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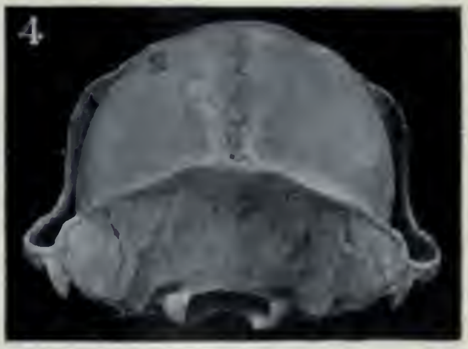

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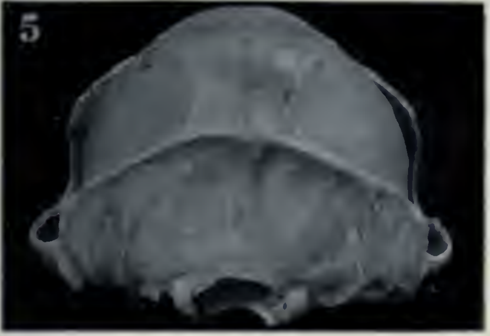

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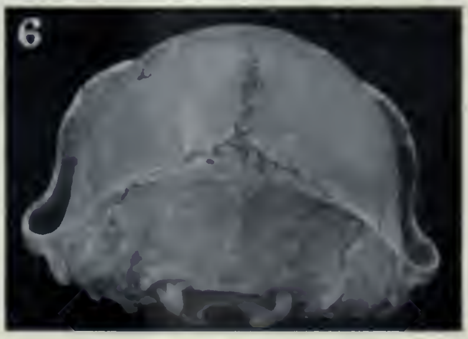
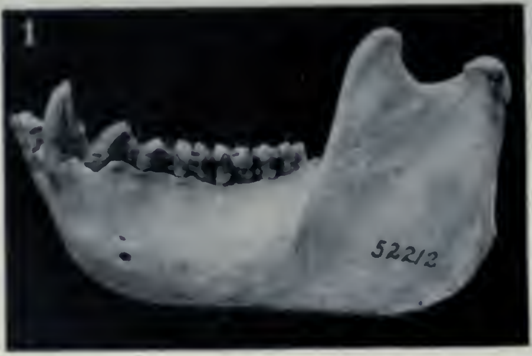


PLATE CXL

Colobus abyssinicus ituricus Matschie

Comparative left lateral views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.
Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 5. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1913.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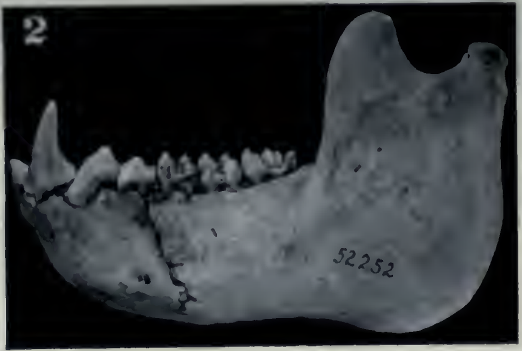
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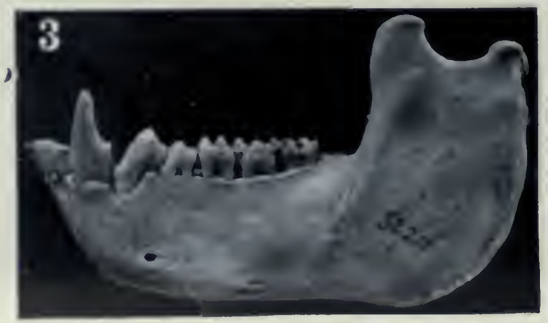
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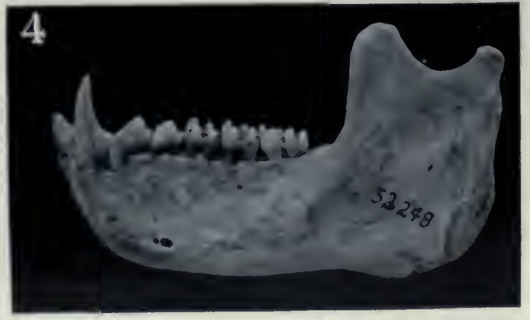
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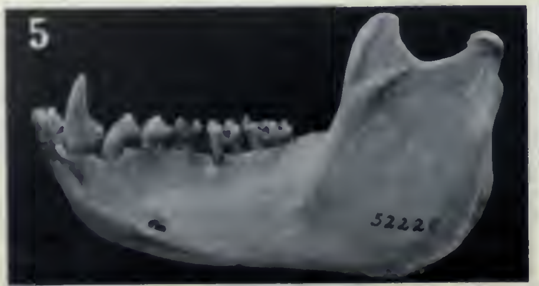
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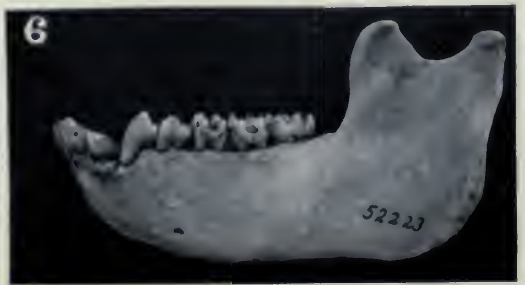
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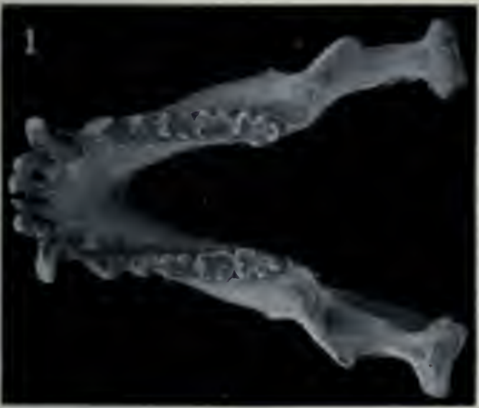
PLATE CXLI

Colobus abyssinicus ituricus Matschie

Comparative crown views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52212, Avakubi, February 23, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52252, Faradje, February 5, 1912.
Fig. 3. Male adult, Amer. Mus. No. 52217, Faradje, February 14, 1911.
Fig. 4. Male adult, Amer. Mus. No. 52248, Faradje, October 31, 1912.
Fig. 5. Female adult, Amer. Mus. No. 52226, Faradje, February 18, 1911.
Fig. 6. Female adult, Amer. Mus. No. 52223, Faradje, February 15, 1913.



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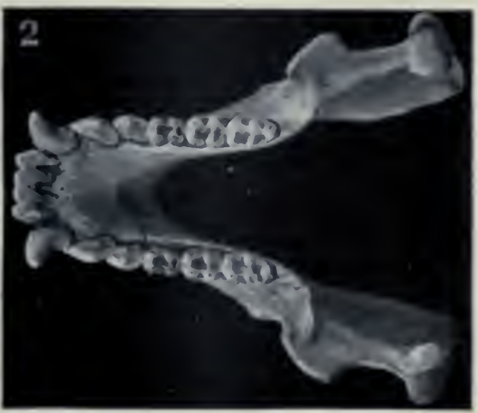

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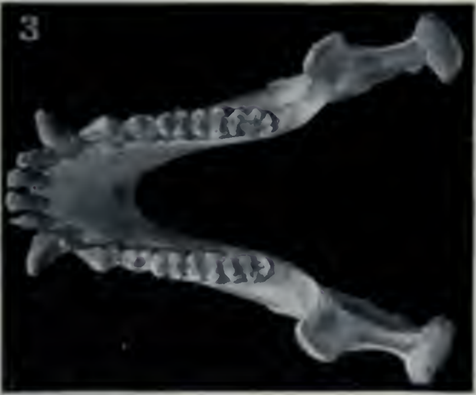

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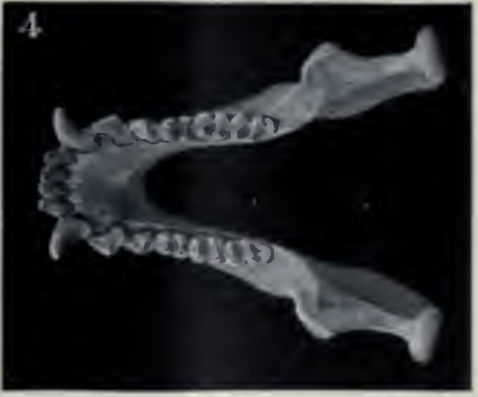

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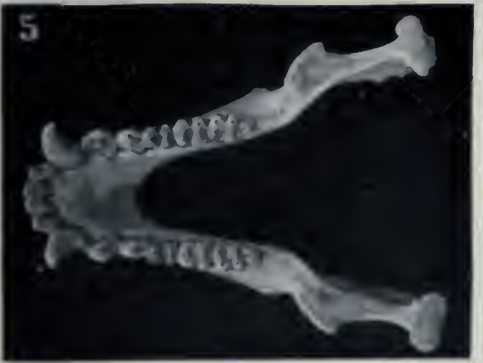

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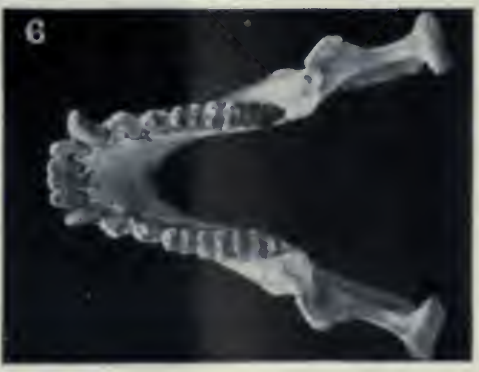


6

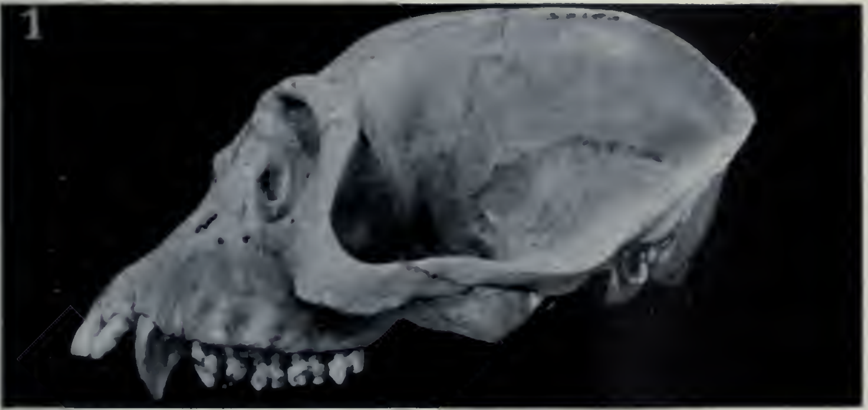
PLATE CXLII

Colobus angolensis cottoni Lydekker

Comparative left lateral views of three adult male skulls. Greatest length of skull, 122.8 mm. Compare with Pl. CXLIII, showing another adult male and two adult female skulls; also with different views to and including Pl. CLI.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.

1



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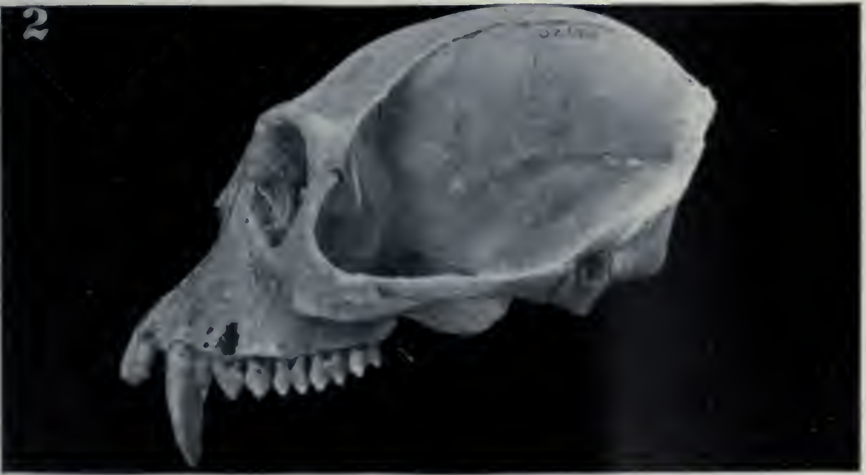

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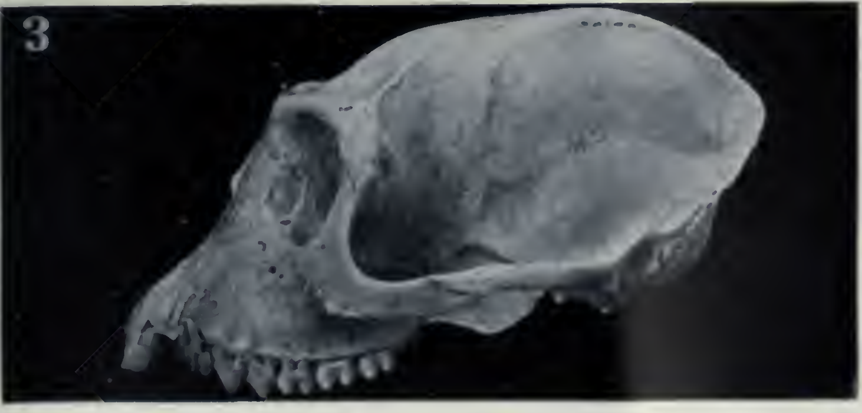

PLATE CXLIII

Colobus angolensis cottoni Lydekker

Comparative left lateral views of one adult male and two adult female skulls. Greatest length of skull, 118.7 mm. Compare with Pl. CXLII, showing three adult male skulls; also with different views to and including Pl. CLI.

Fig. 1. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.

Fig. 2. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.

Fig. 3. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.

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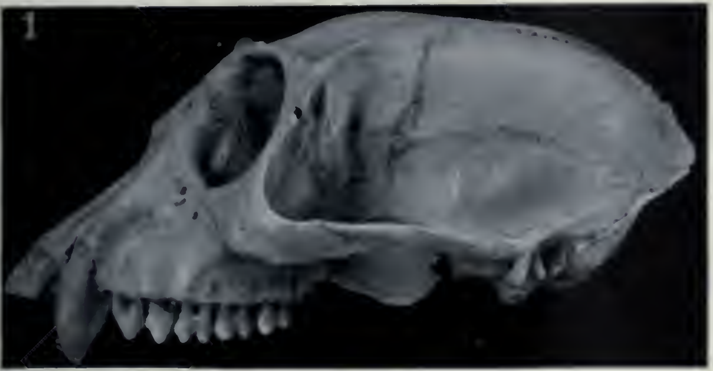

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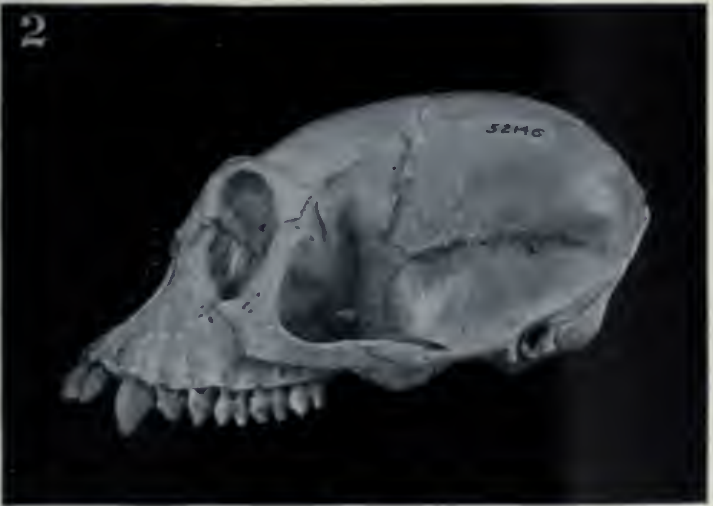

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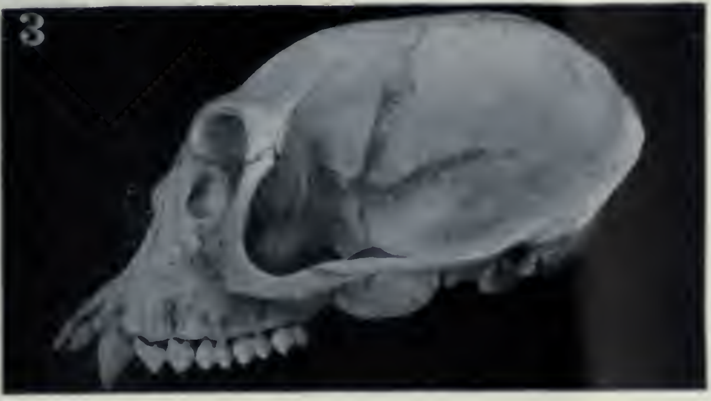


PLATE CXLIV

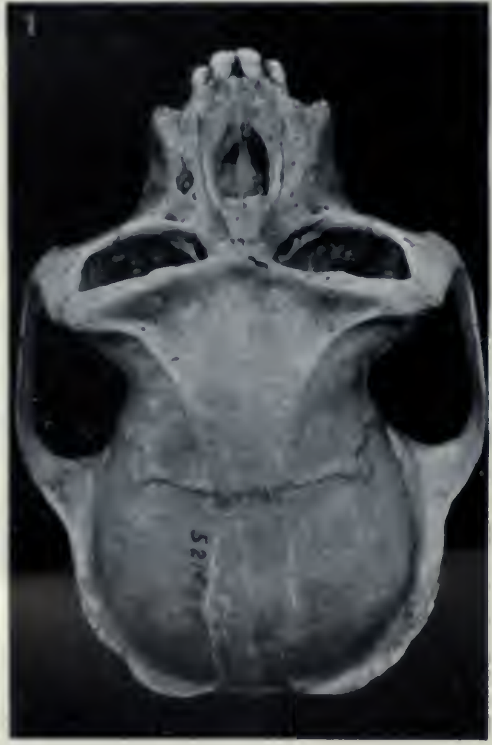
Colobus angolensis cottoni Lydekker

Comparative dorsal views of three adult male skulls. Greatest length of skull, 122.8 mm. Compare with Pl. CXLV, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.

Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.

Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.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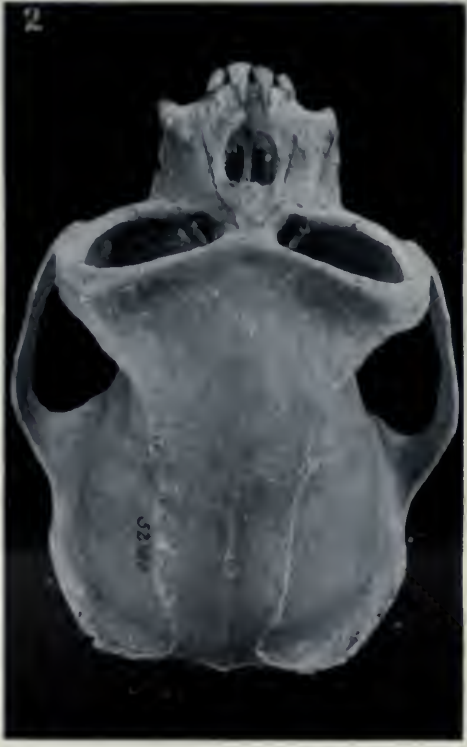
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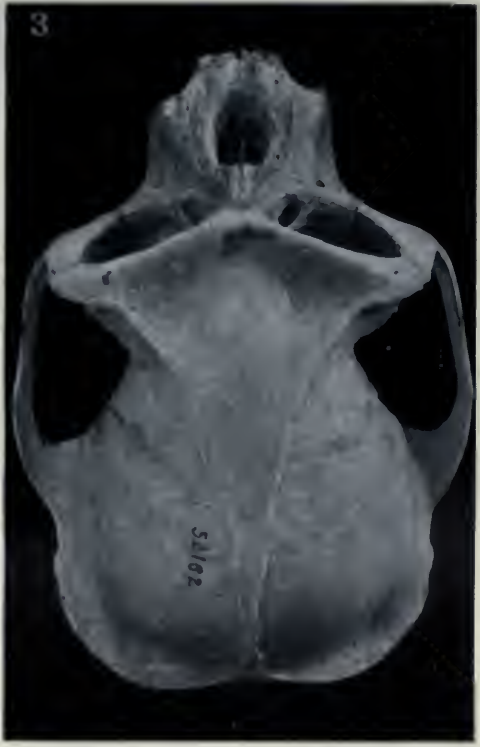
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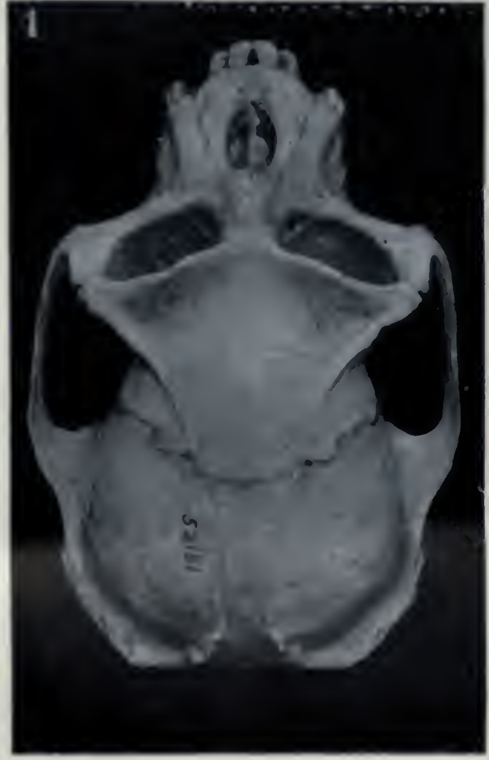
Plate CXLV

Colobus angolensis cottoni Lydekker

Comparative dorsal views of one adult male and two adult female skulls. Greatest length of skull, 118.7 mm. Compare with Pl. CXLIV, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 2. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 3. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.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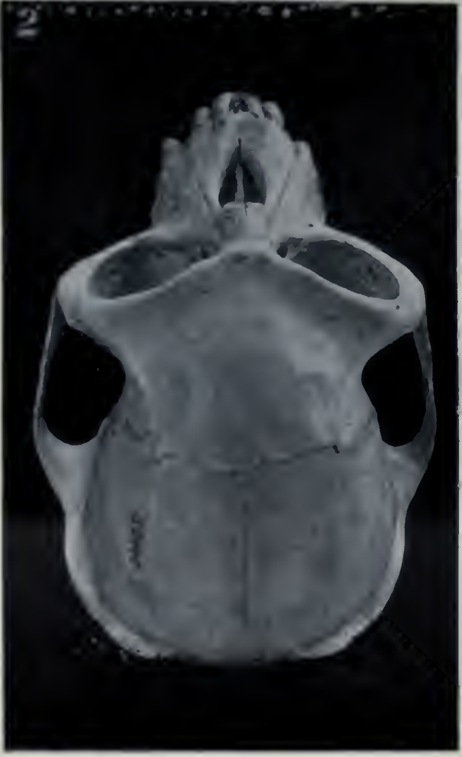
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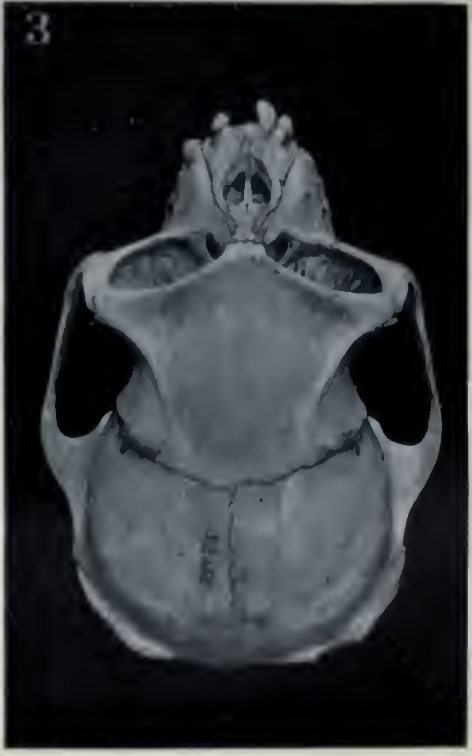
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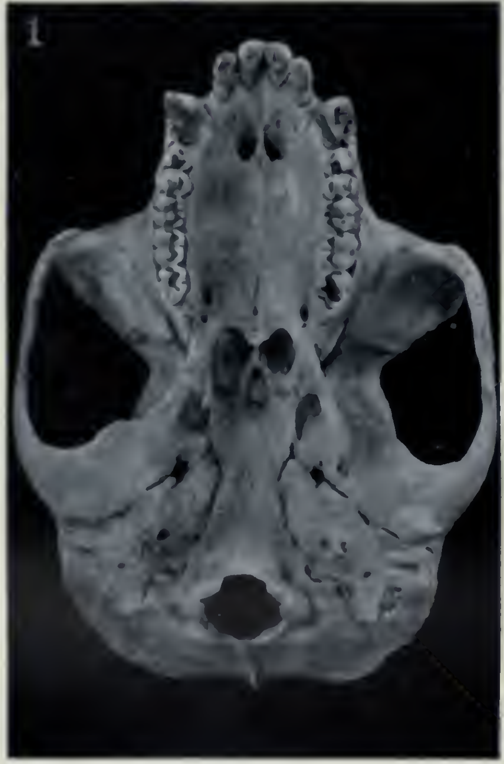
Plate CXLVI

Colobus angolensis cottoni Lydekker

Comparative palatal views of three adult male skulls. Greatest length of skull. 122.8 mm. Compare with Pl. CXLVII, showing another adult male and two adult female skulls.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.



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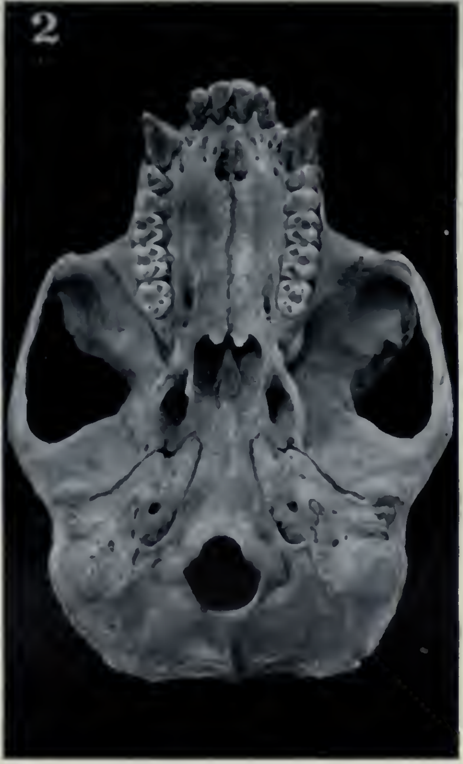

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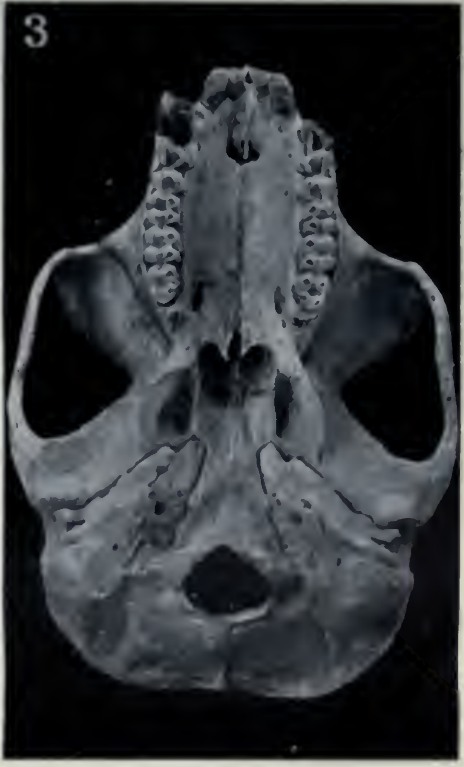

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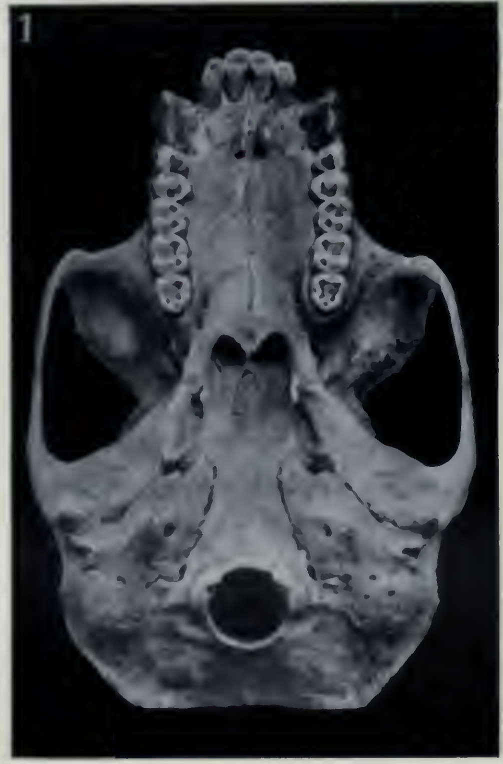
PLATE CXLVII

Colobus angolensis cottoni Lydekker

Comparative palatal views of another adult male and two adult female skulls. Greatest length of skull, 118.7 mm. Compare with Pl. CXLVI, showing three adult male skulls.

Fig. 1. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 2. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 3. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.

1



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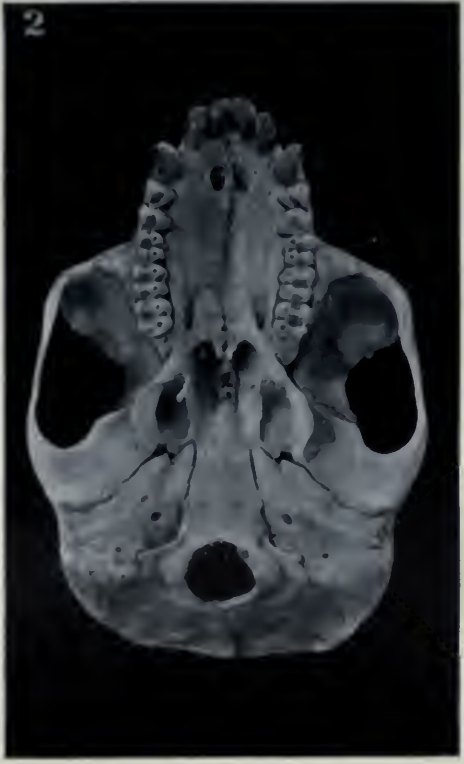

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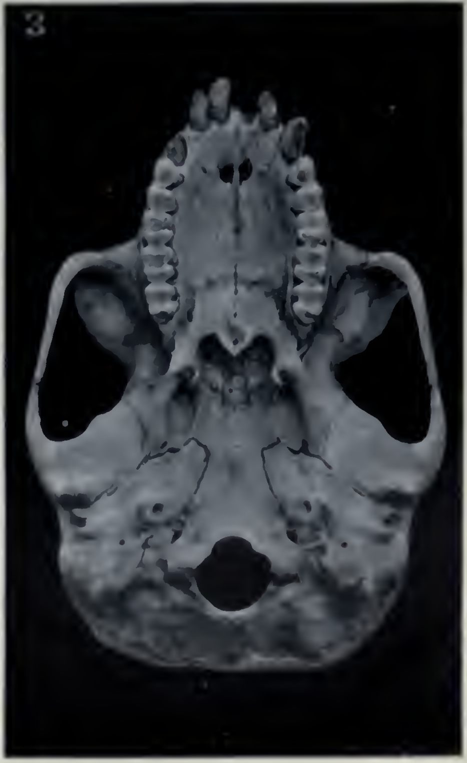
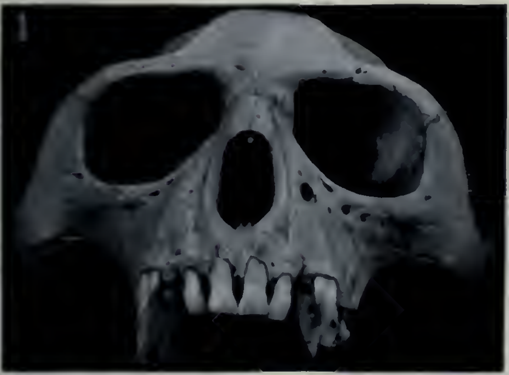


PLATE CXLVIII

Colobus angolensis cottoni Lydekker

Comparative front views of six skulls. Greatest length of skull, 122.8 mm.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.
Fig. 4. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.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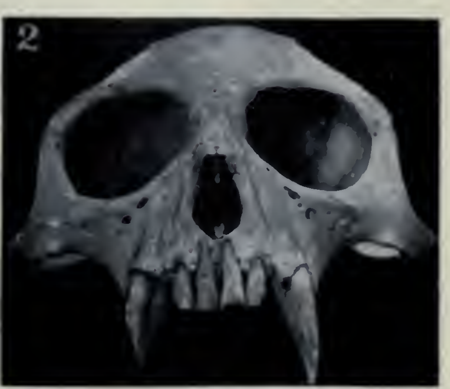
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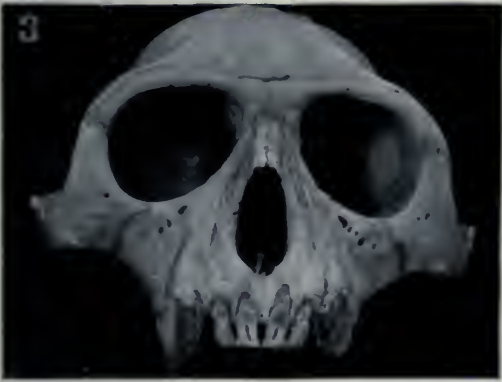
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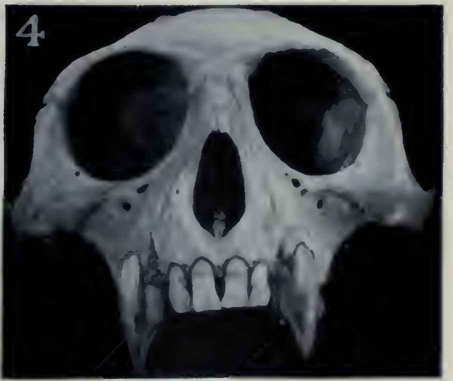
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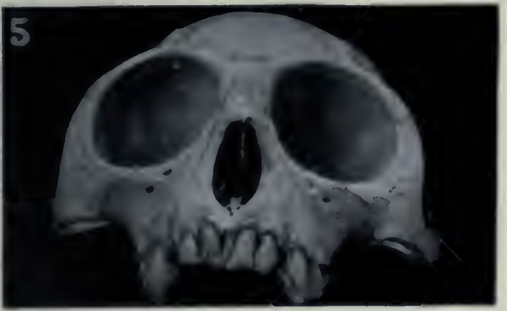
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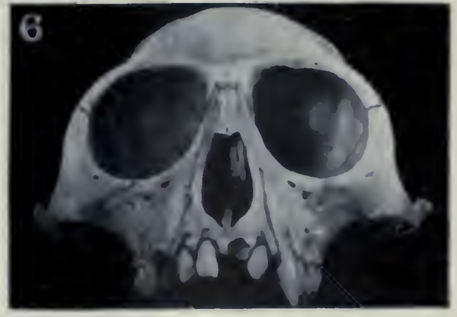
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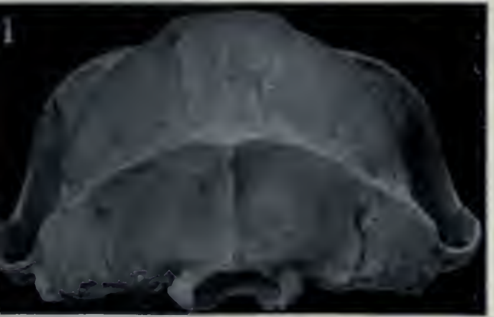
Plate CXLIX

Colobus angolensis cottoni Lydekker

Comparative occipital views of six skulls. Greatest length of skull, 122.8 mm.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.
Fig. 4. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.

1



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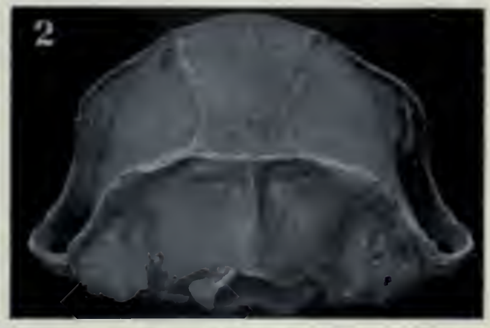

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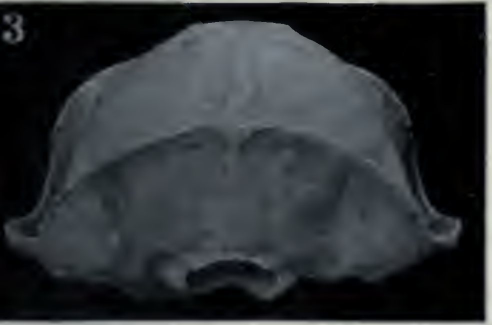

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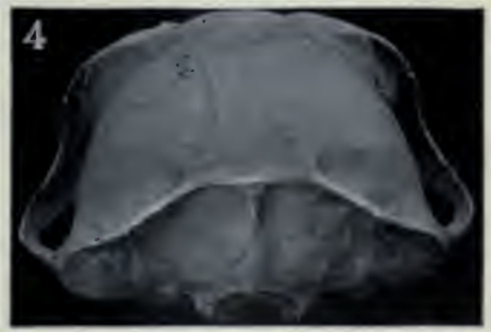

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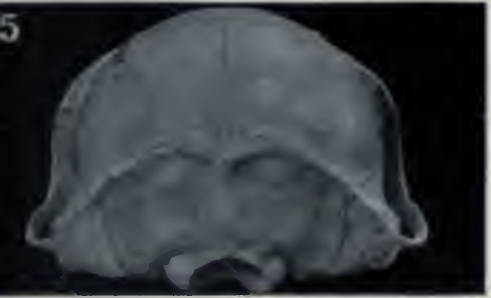

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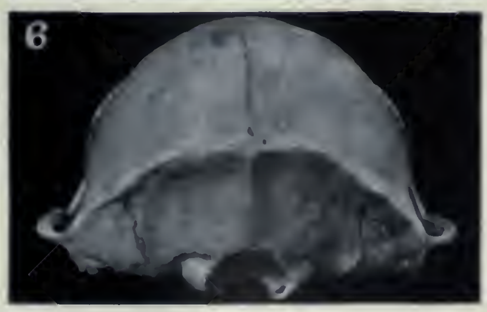

PLATE CL

Colobus angolensis cottoni Lydekker

Comparative left lateral views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.
Fig. 4. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913.

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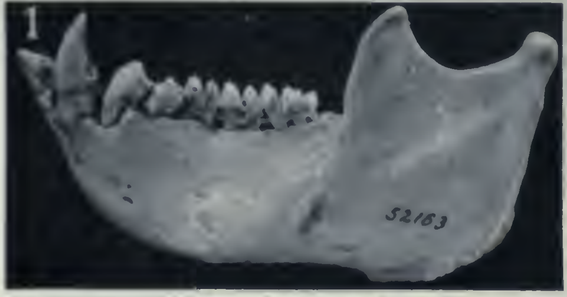

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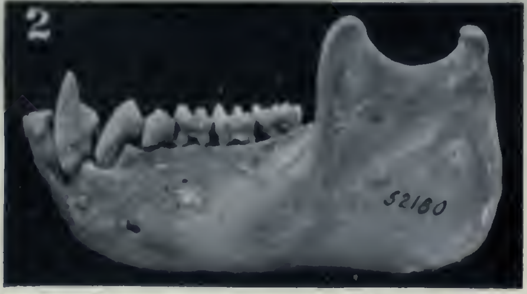

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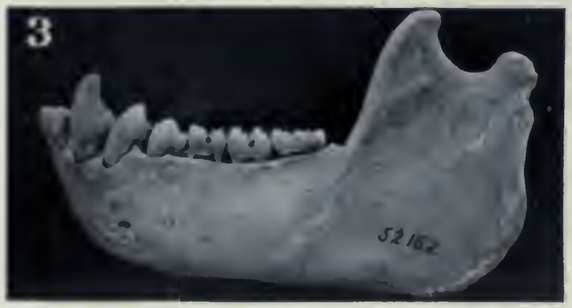

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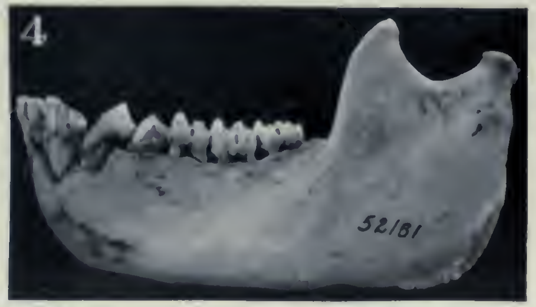

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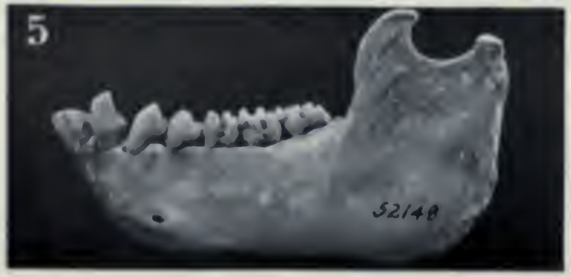

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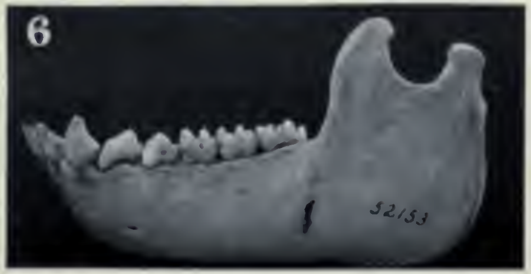

Plate CLI

Colobus angolensis cottoni Lydekker

Comparative crown views of six mandibles.

Fig. 1. Male adult, Amer. Mus. No. 52163, Avakubi, April 14, 1914.
Fig. 2. Male adult, Amer. Mus. No. 52160, Akenge, October 21, 1913.
Fig. 3. Male adult, Amer. Mus. No. 52162, Akenge, October 28, 1913.
Fig. 4. Male adult, Amer. Mus. No. 52161, Akenge, October 23, 1913.
Fig. 5. Female adult, Amer. Mus. No. 52146, Akenge, October 2, 1913.
Fig. 6. Female adult, Amer. Mus. No. 52153, Akenge, October 7, 1913

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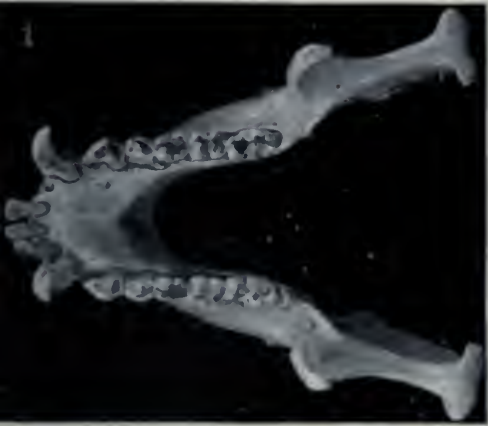

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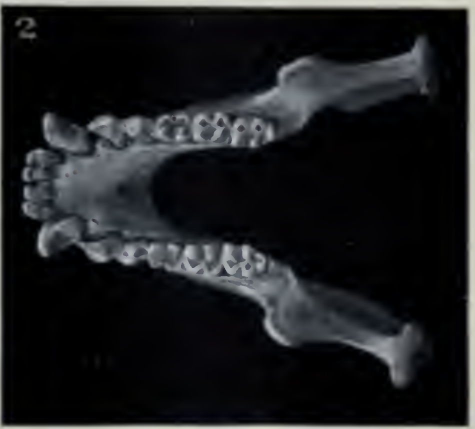

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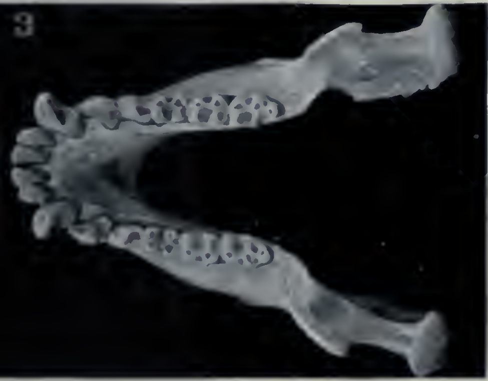

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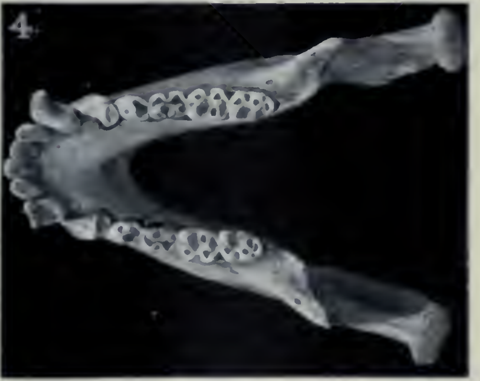

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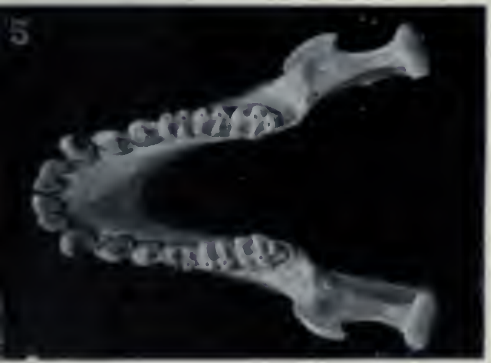

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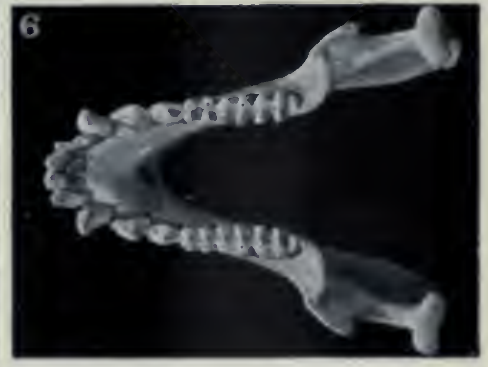
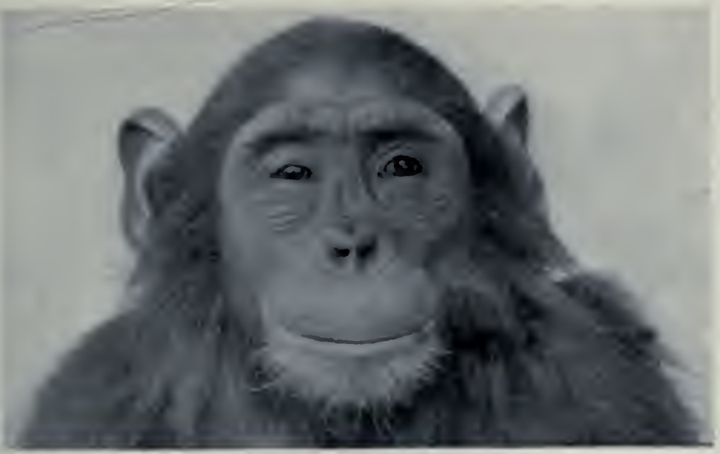


PLATE CLII

Pan schweinfurthii (Giglioli)

Male subadult, Amer. Mus. No. 51391, Niapu, November 12, 1913. Total length of animal, 550 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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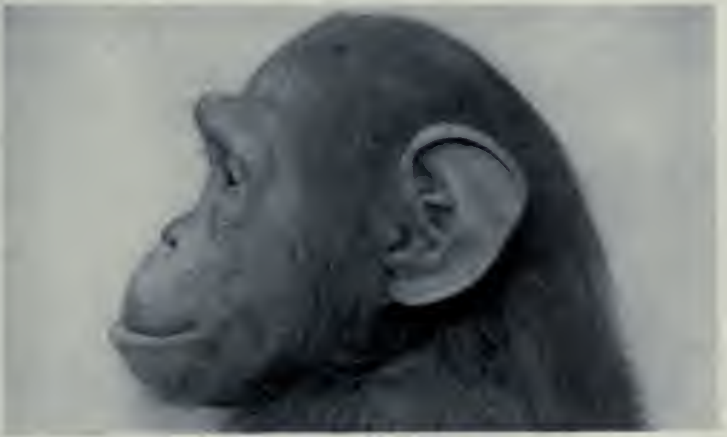

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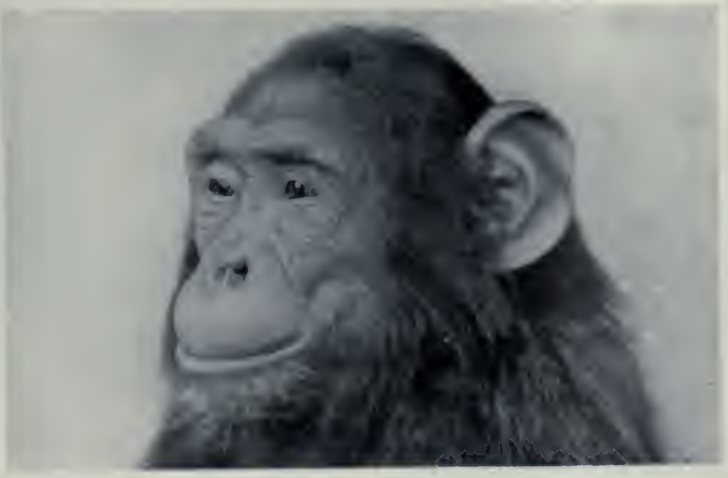

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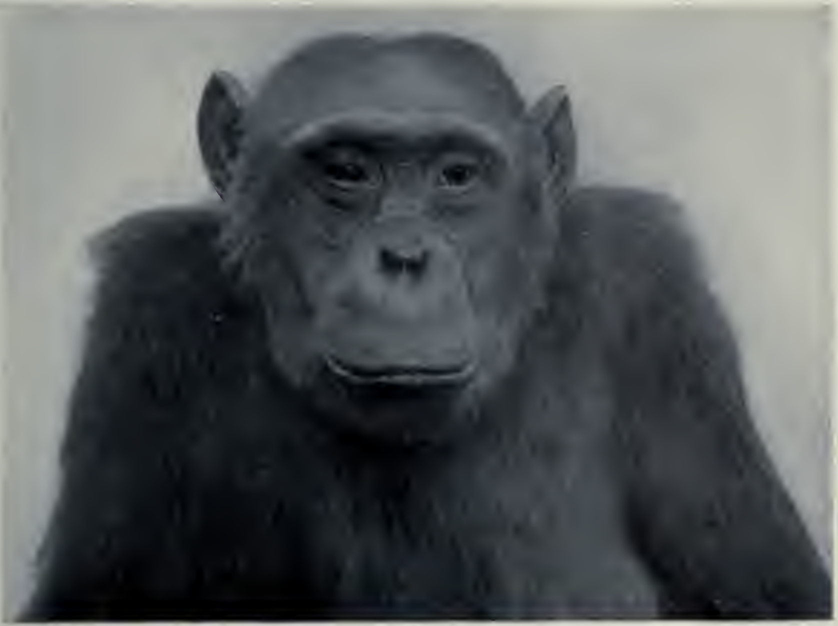
Plate CLIII

Pan schweinfurthii (Giglioli)

Male adult, Amer. Mus. No. 51382, Niapu, November 14, 1913. Total length of animal, 790 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. Compare with Pl. CLIV, fig. 1 for three-quarter view.



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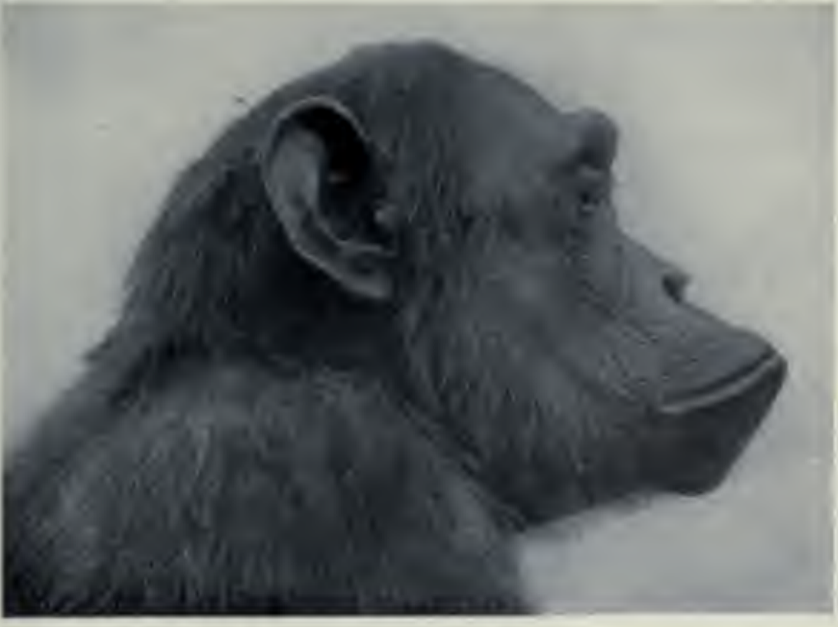

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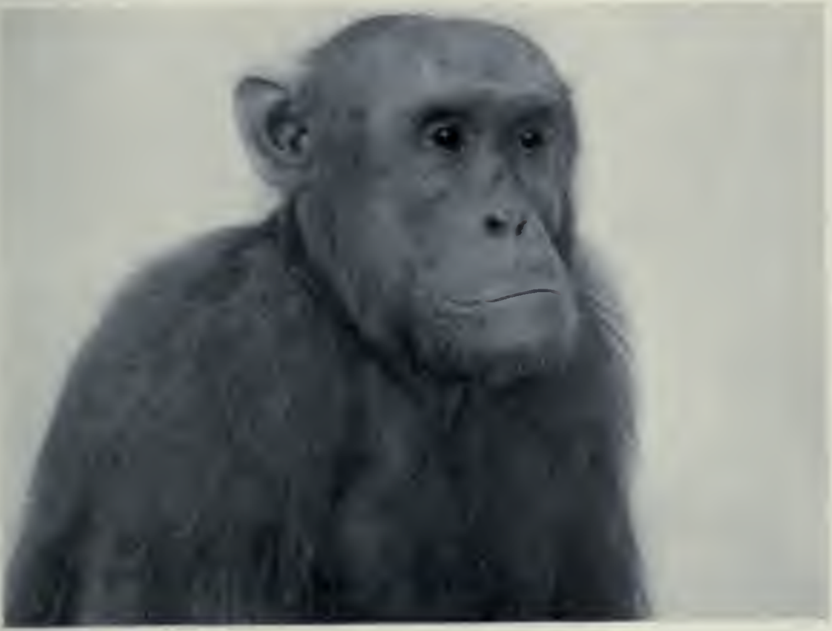
PLATE CLIV

Pan schweinfurthii (Giglioli)

Fig. 1. Male adult, Amer. Mus. No. 51382, Niapu, November 14, 1913. Total length of animal, 790 mm. Three-quarter view of head. Compare with Pl. CLIII for front and side views.

Fig. 2. Female adult, Amer. Mus. No. 52132, Akenge, October 4, 1913. Total length of animal, 850 mm. Three-quarter view of head. Compare with Pl. CLV for front and side views. Specimens in the flesh.



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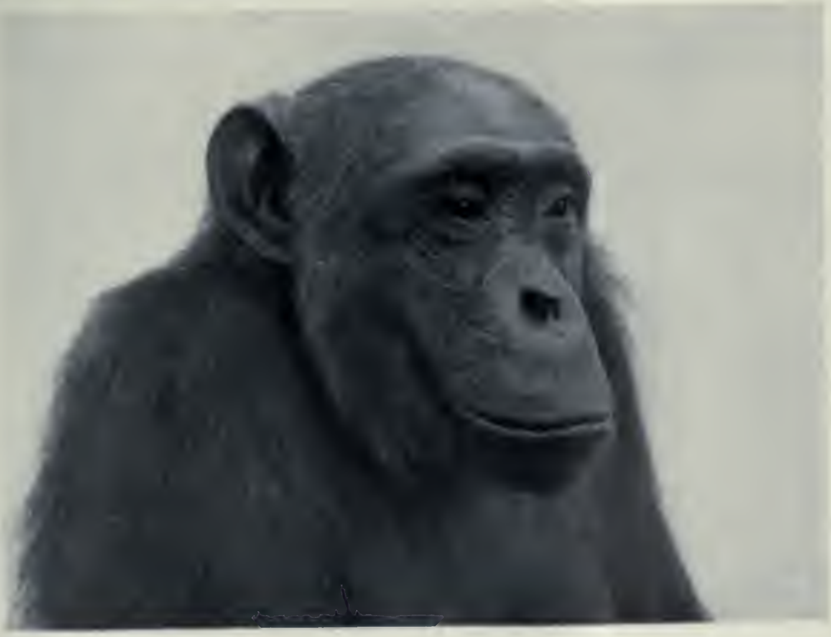

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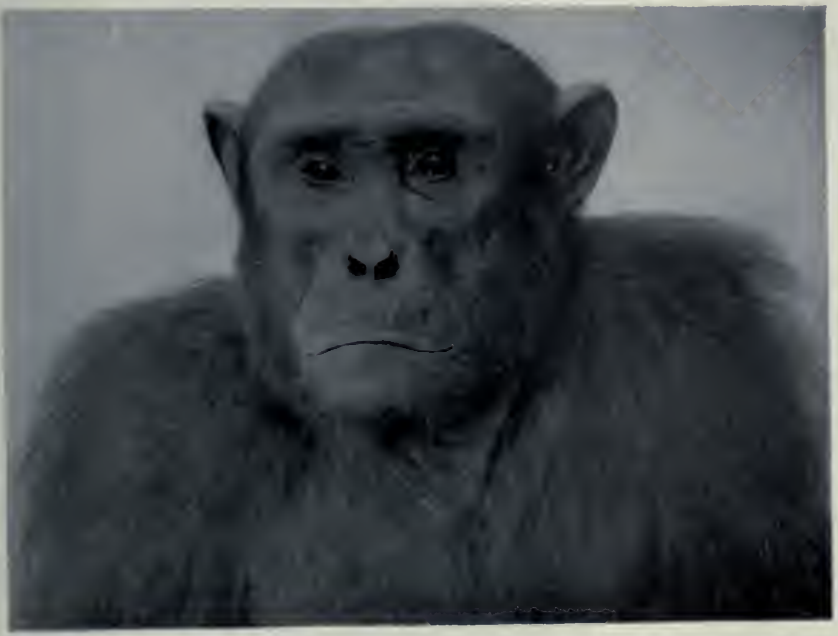
PLATE CLV

Pan schweinfurthii (Giglioli)

Female adult, Amer. Mus. No. 52132, Akenge, October 4, 1913. Total length of animal, 850 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. Compare with Pl. CLIV, fig. 2 for three-quarter view.



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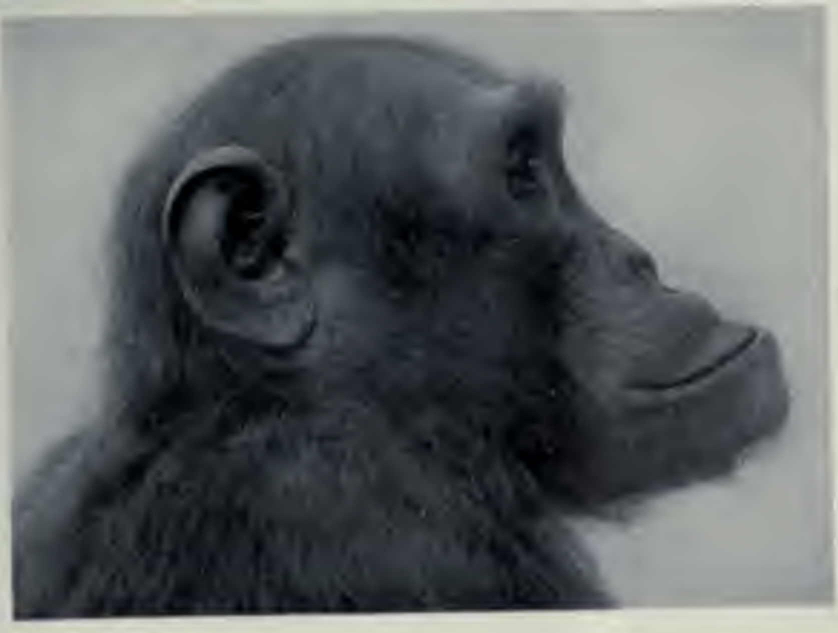

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PLATE CLVI

Pan schweinfurthii (Giglioli)

Female adult, Amer. Mus. No. 52132, Akenge, October 4, 1913. Total length of animal, 850 mm. Showing general body proportions. Same animal figured on Pls. CLIV, fig. 2 and CLV. Specimen in the flesh.

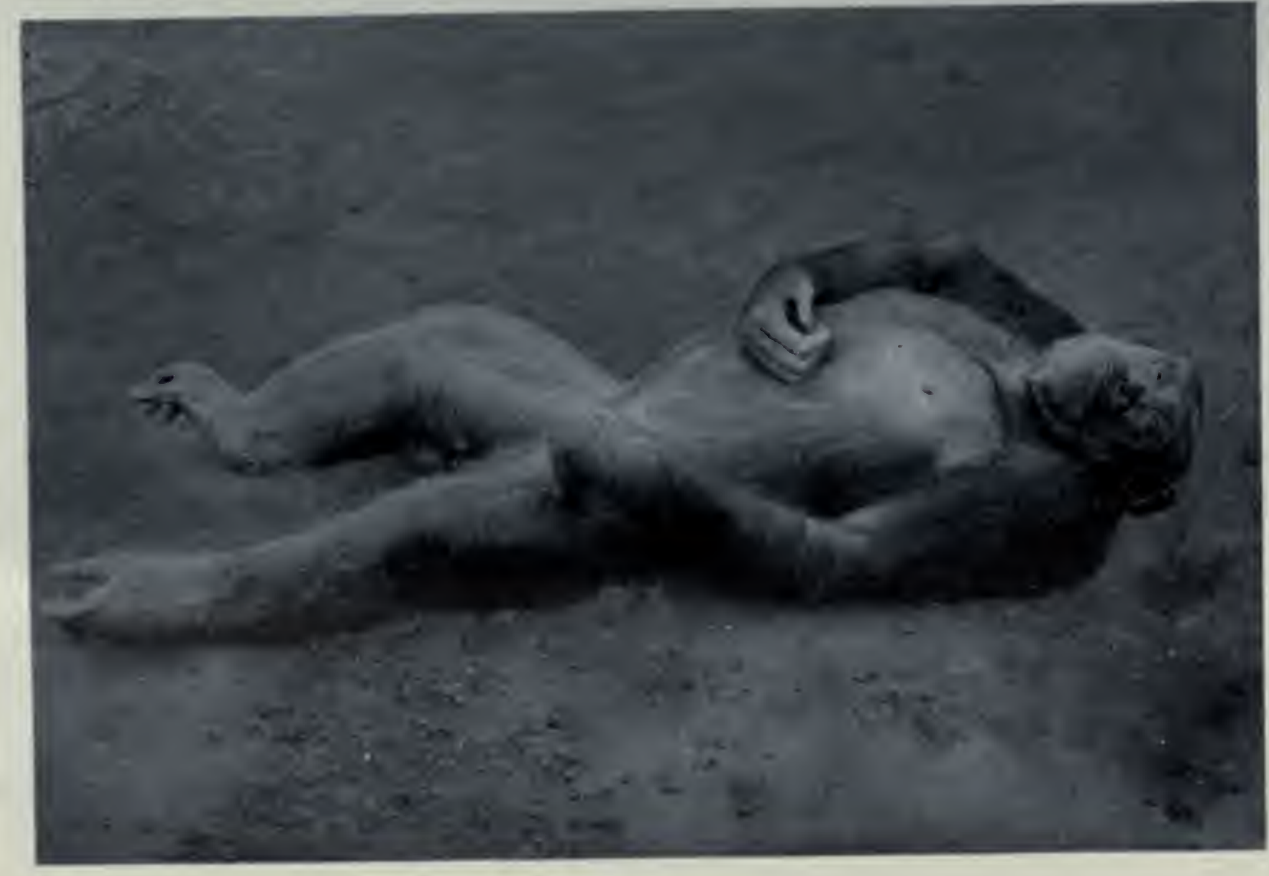
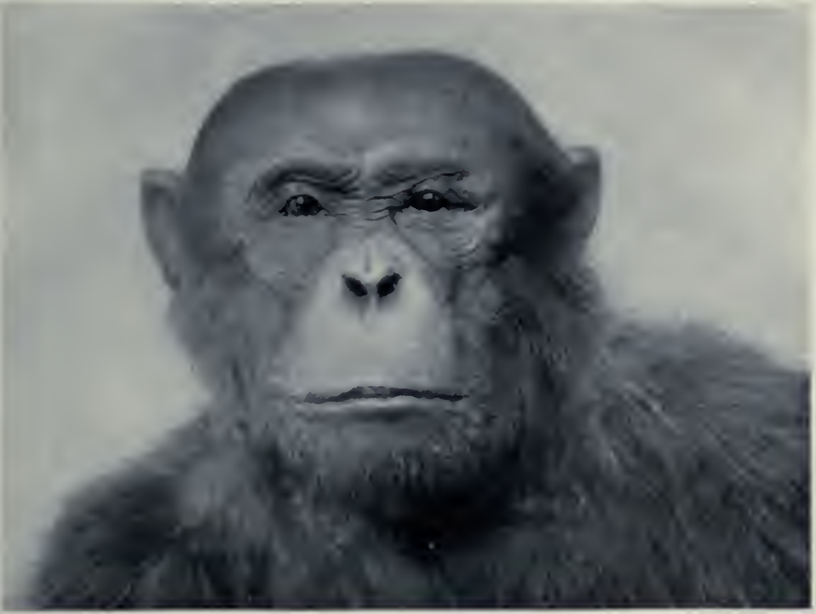


PLATE CLVII

Pan schweinfurthii (Giglioli)

Male adult, Amer. Mus. No. 51278, Akenge, September 15, 1913. Total length of animal, 840 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. Compare with Pl. CLVIII, fig. 1 for three-quarter view.



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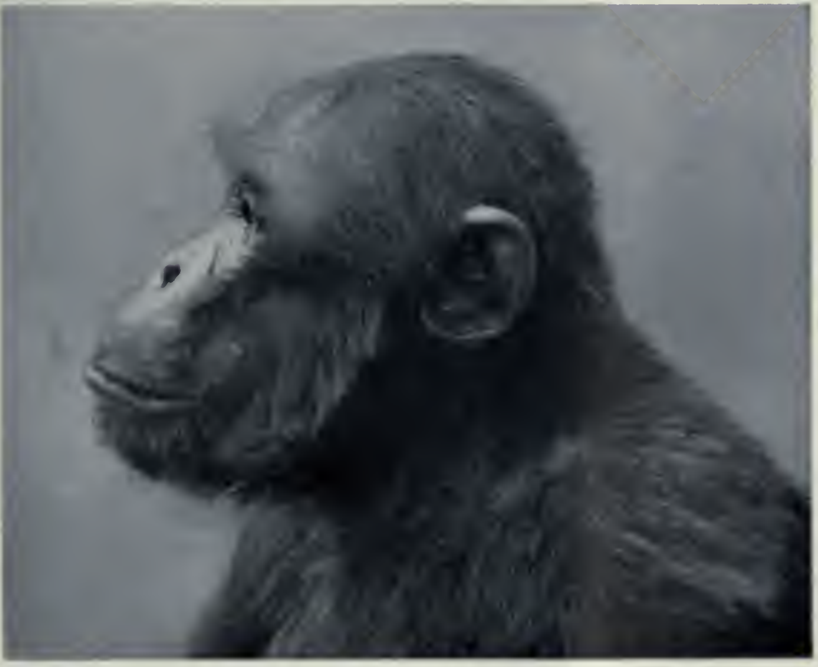

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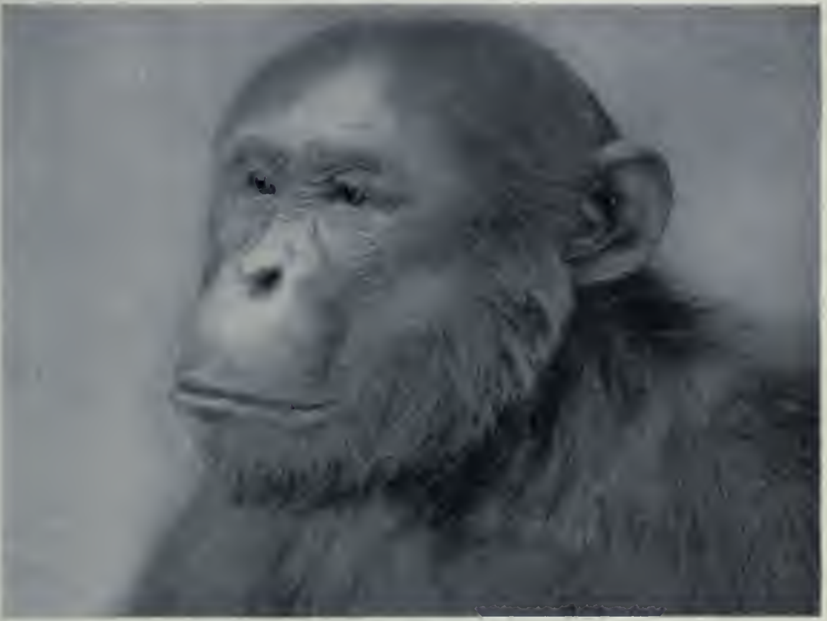
PLATE CLVIII

Pan schweinfurthii (Giglioli)

Fig. 1. Male adult, Amer. Mus. No. 51278, Akenge, September 15, 1913. Total length of animal, 840 mm. Three-quarter view of head. Compare with Pl. CLVII for front and side views.

Fig. 2. Female adult, Amer. Mus. No. 51376, Faradje, April 1, 1911. Total length of animal, 830 mm. Three-quarter view of head. Compare with Pl. CLIX for front and side views. Specimens in the flesh.



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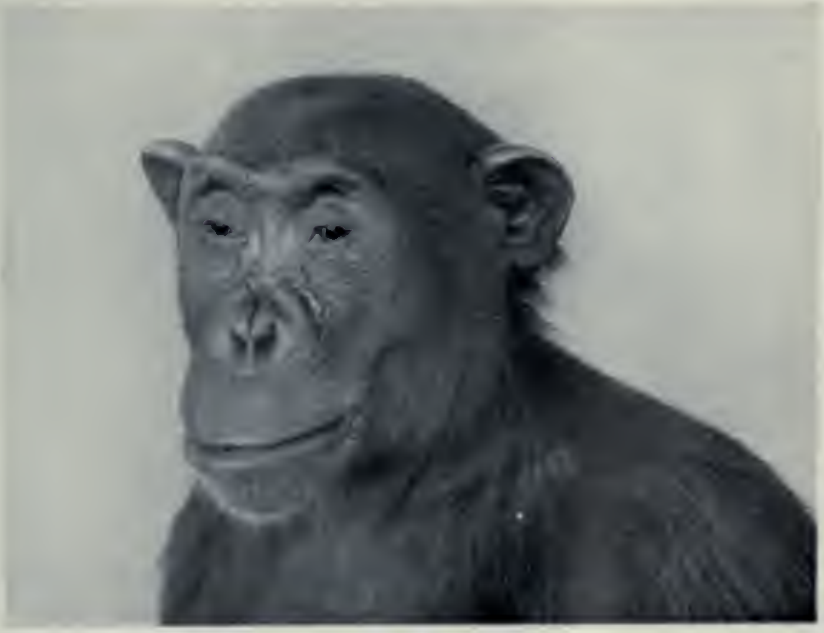

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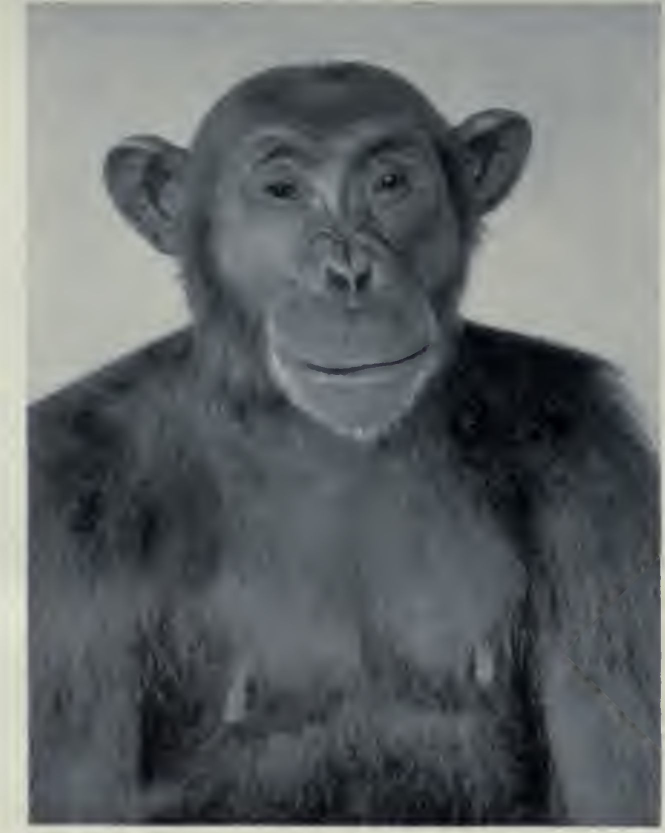
PLATE CLIX

Pan schweinfurthii (Giglioli)

Female adult, Amer. Mus. No. 51376, Faradje, April 1, 1911. Total length of animal, 830 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head. Compare with Pl. CLVIII, fig. 2 for three-quarter view.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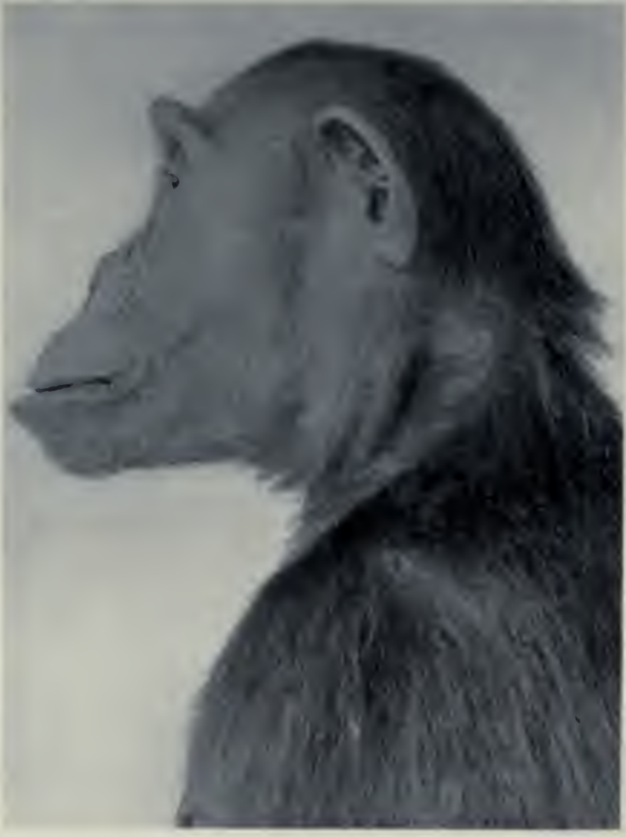
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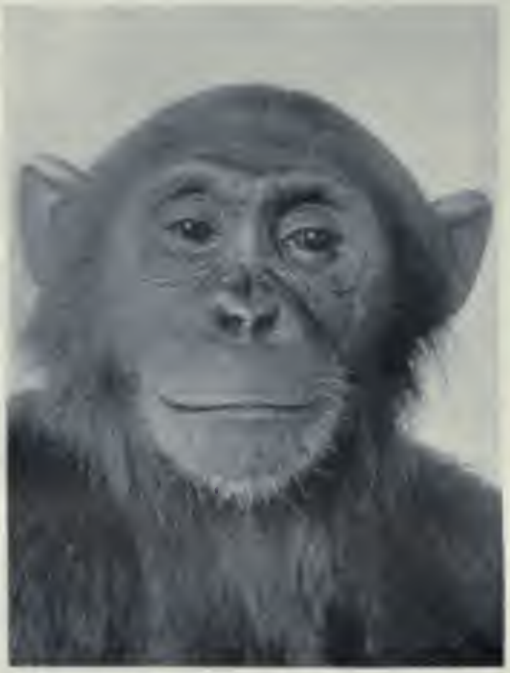
PLATE CLX

Pan schweinfurthii (Giglioli)

Female subadult, Amer. Mus. No. 51392, Faradje, April 3, 1911. Total length of animal, 700 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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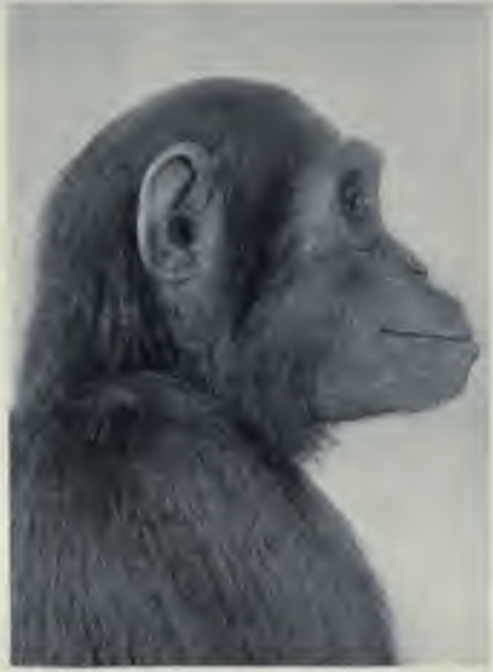

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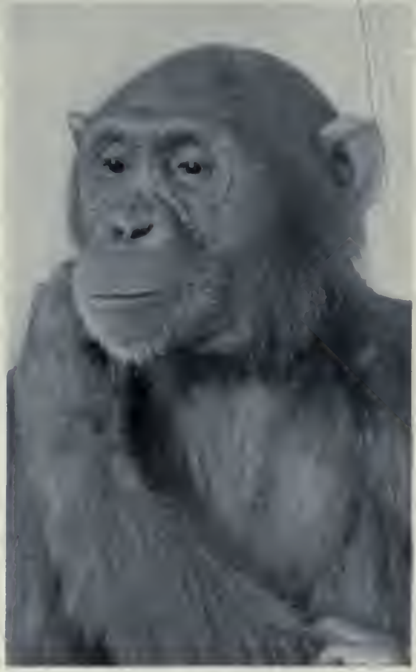


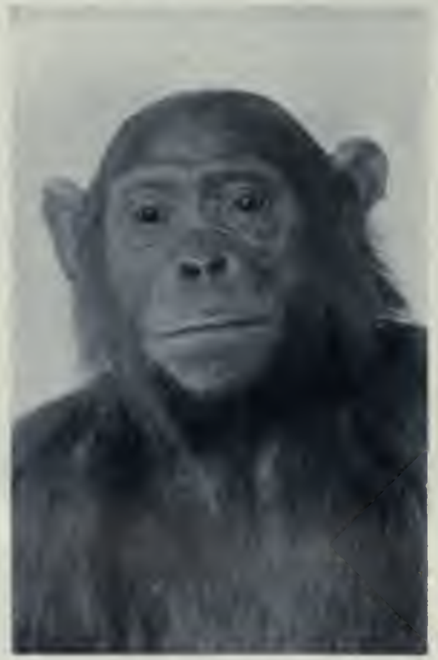
3

Plate CLXI

Pan schweinfurthii (Giglioli)

Female juvenile, Amer. Mus. No. 51386, Faradje, April 3, 1911. Total length of animal, 608 mm. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head.



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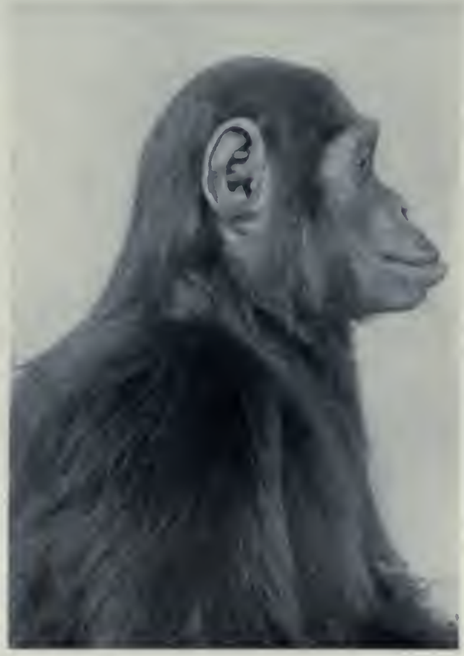

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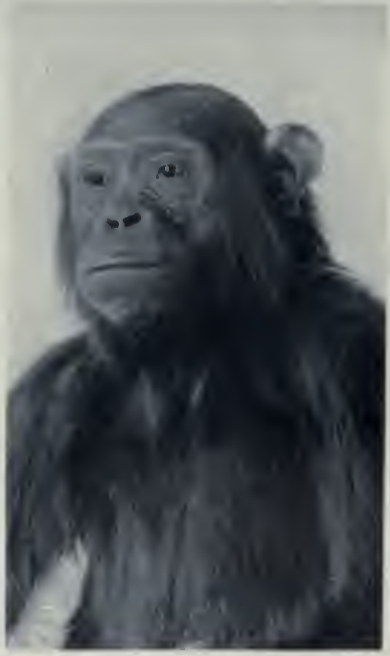


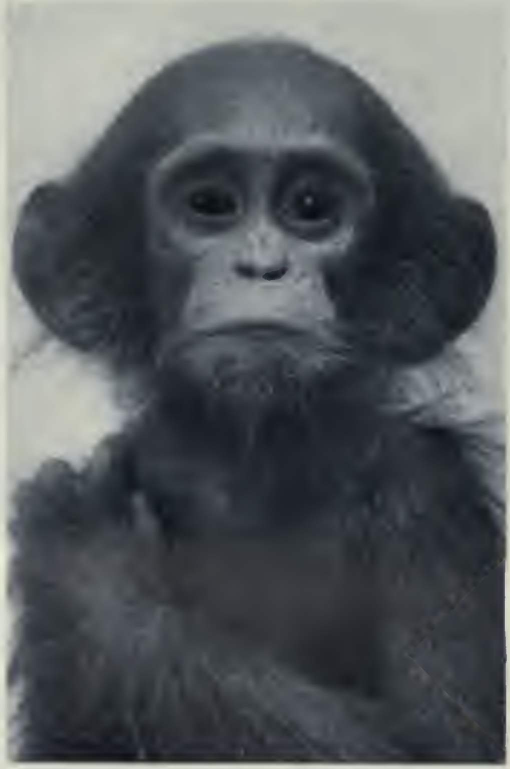
3

Plate CLXII

Pan schweinfurthii (Giglioli)

Male juvenile, Amer. Mus. No. 51206, Faradje, November 10, 1912. Total length of animal, 370 mm. Specimen in the flesh.

Figs. 1, 2 and 3. Front, side, and three-quarter views of head.



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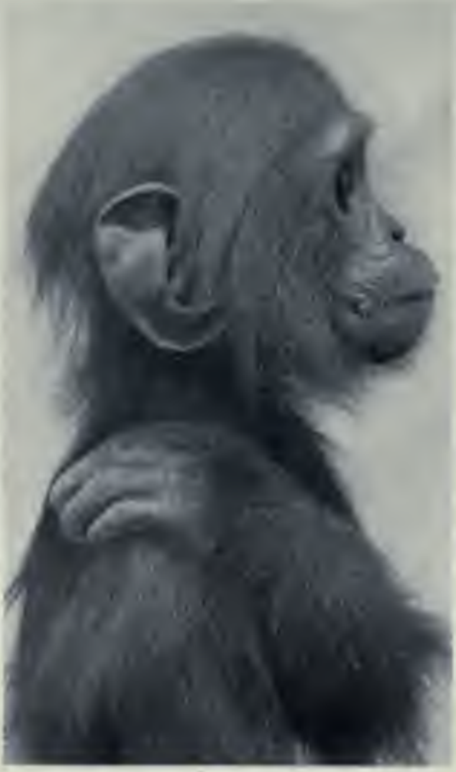

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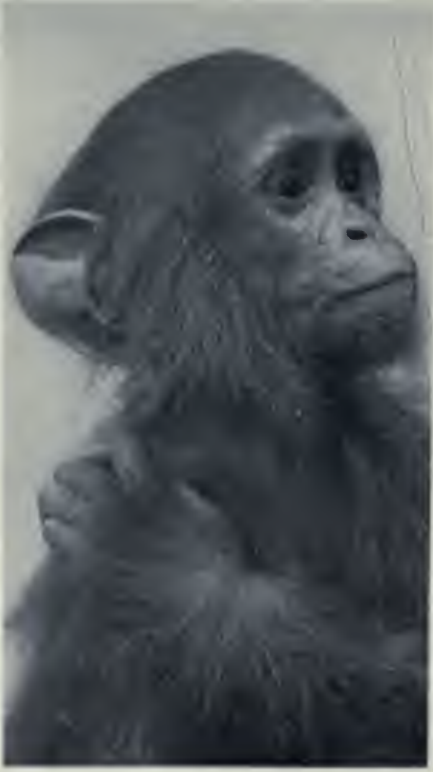


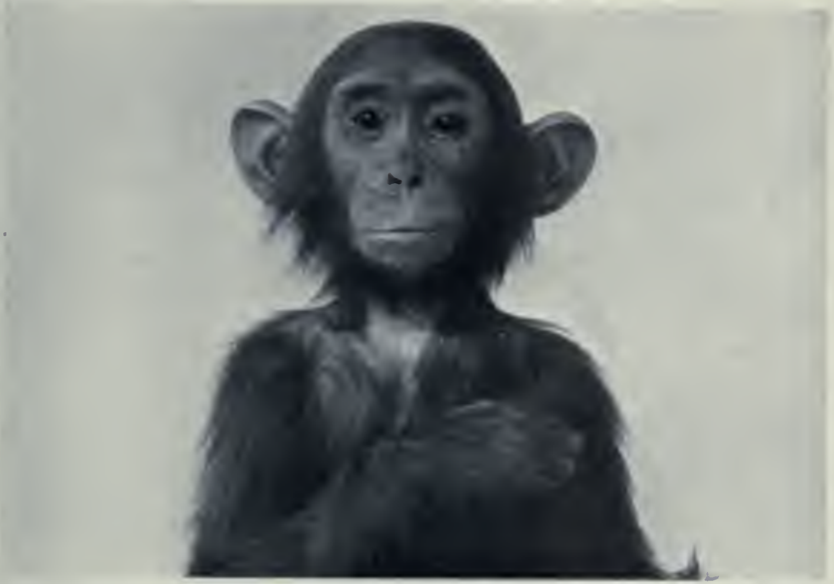
3

PLATE CLXIII

Pan schweinfurthii (Giglioli)

Female juvenile, Amer. Mus. No. 51387, Faradje, April 3, 1911. Total length of animal, 410 mm. Specimen in the flesh.

Figs. 1 and 2. Front and side views of head.



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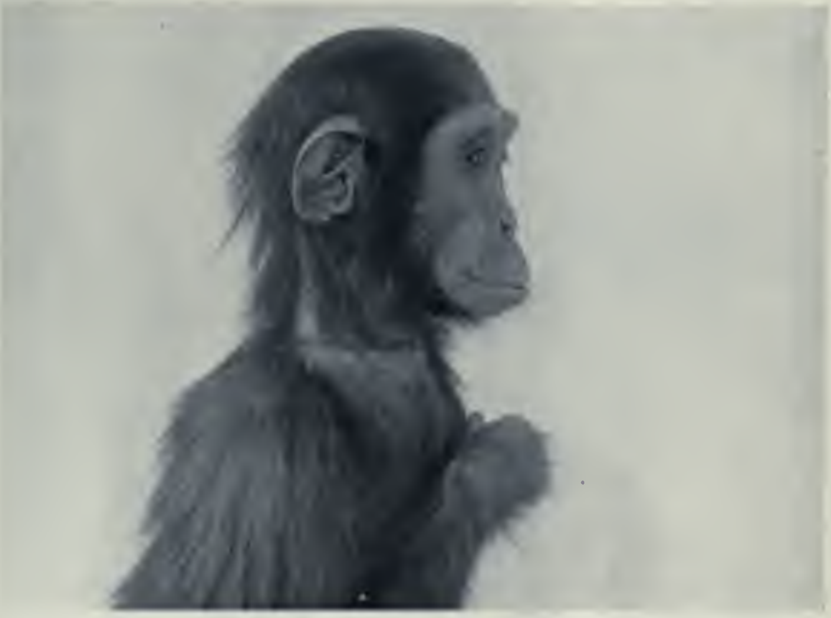

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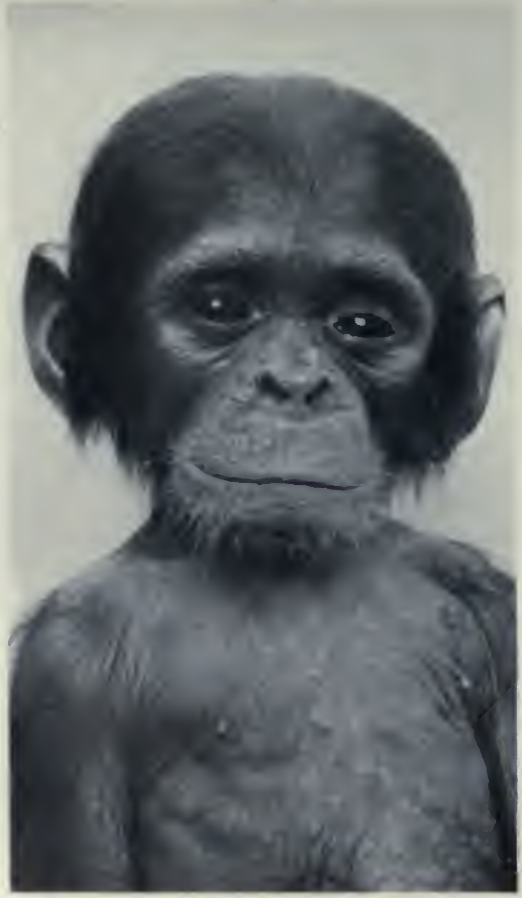
PLATE CLXIV

Pan schweinfurthii (Giglioli)

Male juvenile, Amer. Mus. No. 51379, Faradje, November 9, 1912. Specimen in the flesh.

Figs. 1, 2, and 3. Front, side, and three-quarter views of head. Same animal shown on Pl. CLXV.



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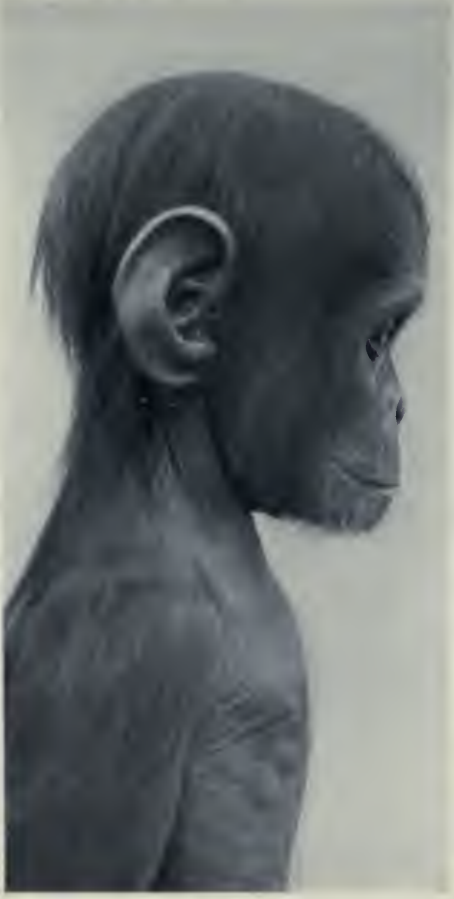

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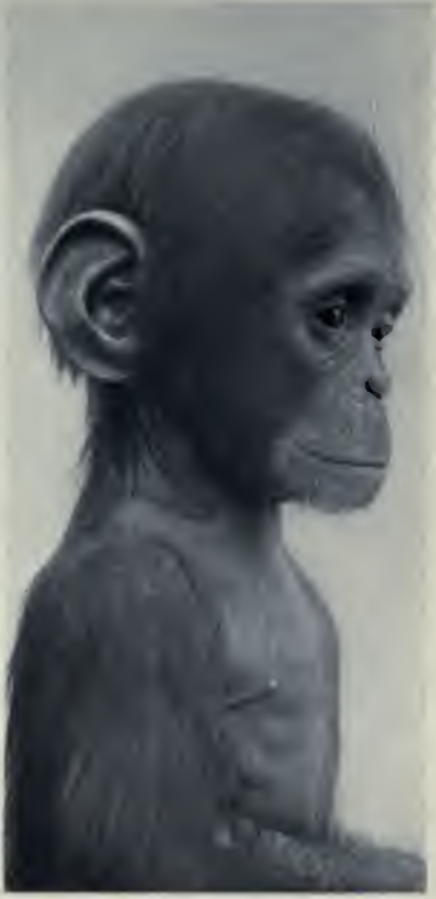

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PLATE CLXV

Pan schweinfurthii (Giglioli)

Male juvenile, Amer. Mus. No. 51379, Faradje, November 9, 1912. Showing general body proportions. Specimen in the flesh.

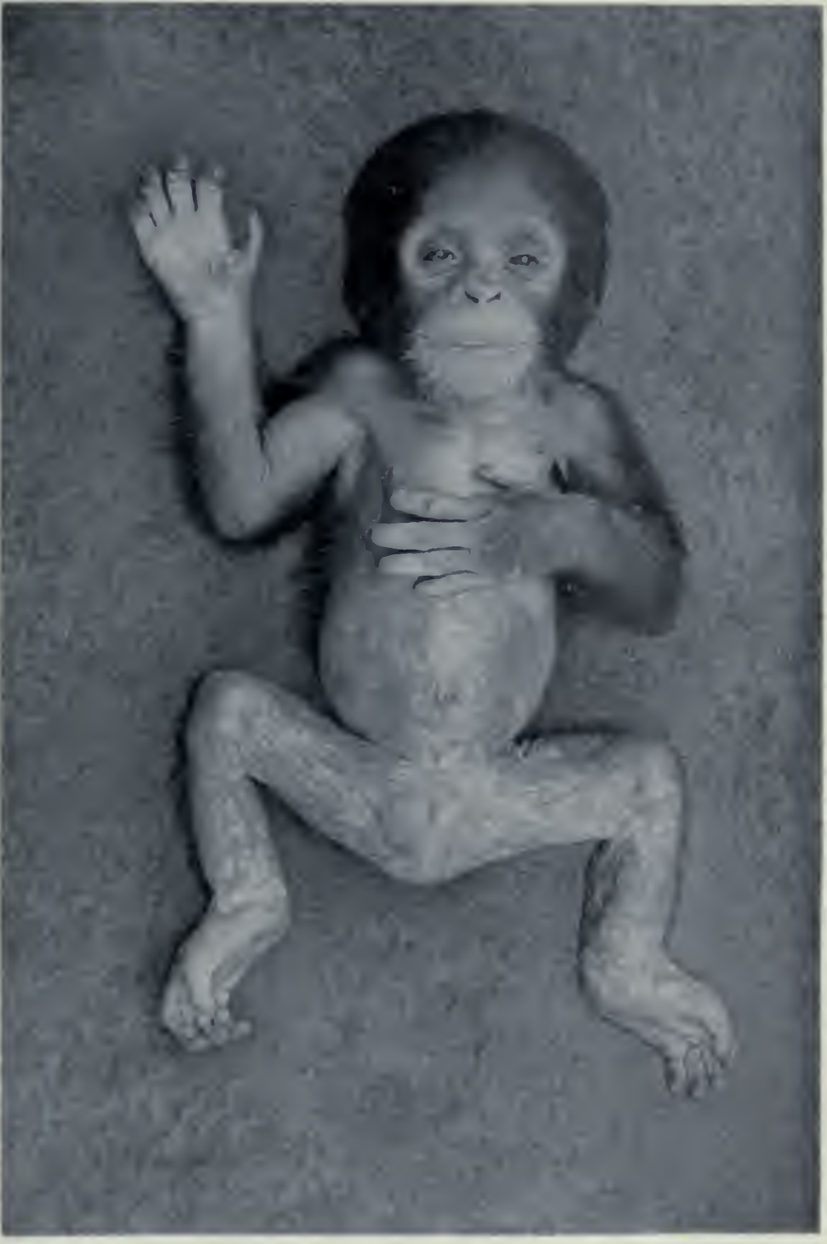
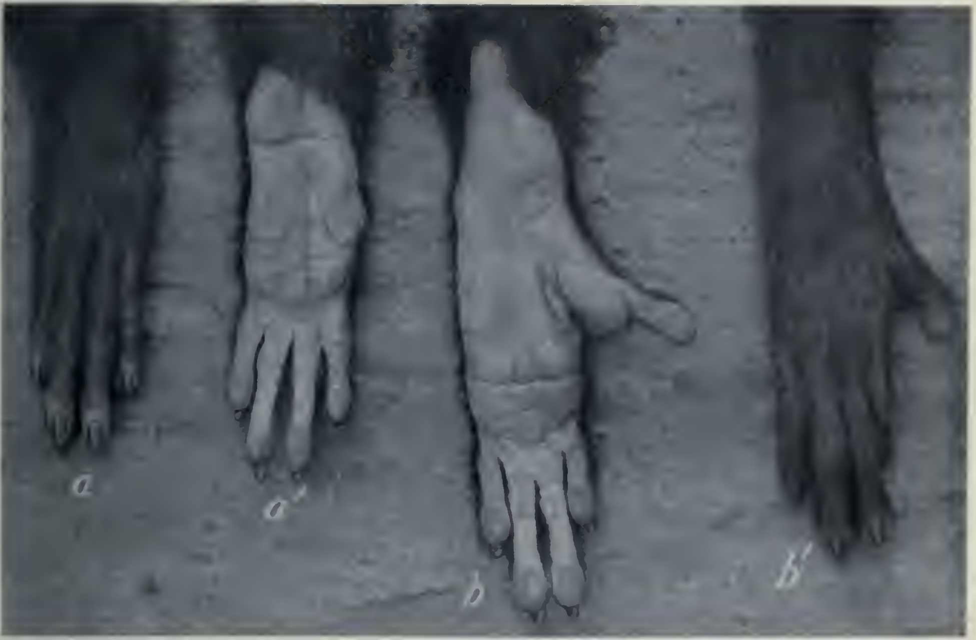


PLATE CLXVI

Fig. 1. Hands and feet of *Colobus angolensis cottoni* Lydekker. Female adult. *a*, dorsal surface of right hand; *a′*, palmar surface of left hand; *b*, plantar surface of left foot; *b′*, dorsal surface of right foot.

Fig. 2. Hand and foot of *Pan schweinfurthii* (Giglioli). Female adult, Amer. Mus. No. 51392, Faradje, April 3, 1911. Length of hindfoot, 220 mm. *c*, palmar surface of left hand; *d*, plantar surface of left foot. Specimens in the flesh.



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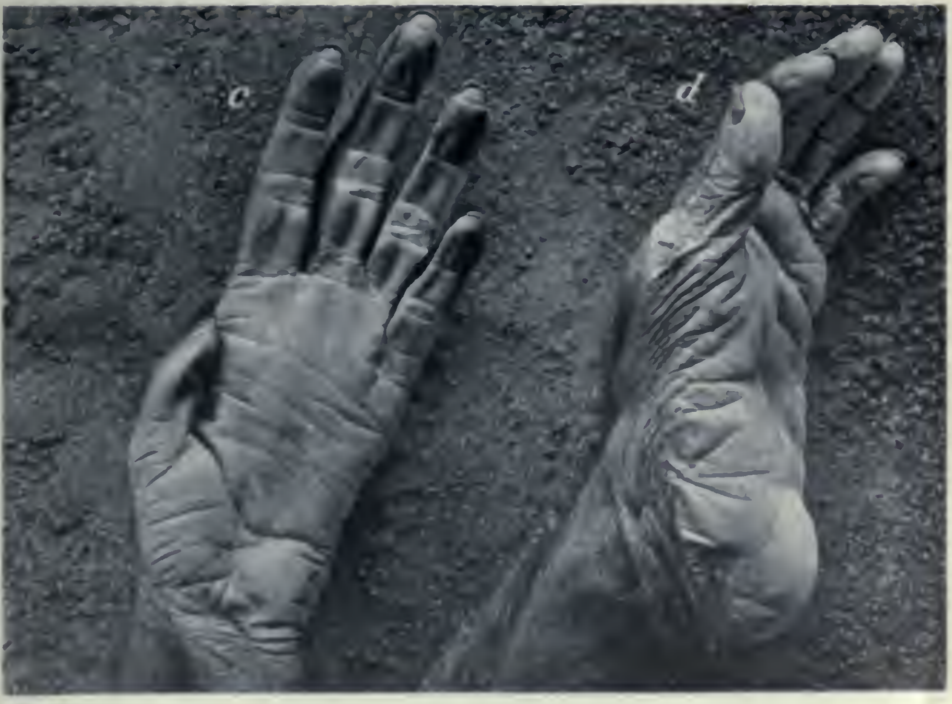

2

Plate CLXVII

Nest of *Pan schweinfurthii* (Giglioli). North of Niapu, November 19, 1913. After selecting a site for a nest, these monkeys break and bend down the branches and twigs in such a manner as to form a more or less horizontal resting place.

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